THE BRITISH JOURNAL OF OPHTHALMOLOGY

VOL. 21. JANUARY, 1937. No. 1

CONTENTS.

Communications PAGE

1. Ophthalmology and Research. By Sir John Parsons 1
2. Intracapsular Cataract Extraction. By O. M. Duthie 16
3. A Case of Perivasculitis Retinae Associated with Symptoms of Cerebral Disease. By A. J. Ballantyne and I. C. Michaelson 22
4. Katholysis in the Treatment of Retinal Detachment. A Preliminary Note. By H. B. Stallard 35

Annotation

1916—1937 45

Abstracts

I. Medical Ophthalmology 46
II. Miscellaneous 52

Book Notices 58

Correspondence 60

Notes 62

Future Arrangements 62

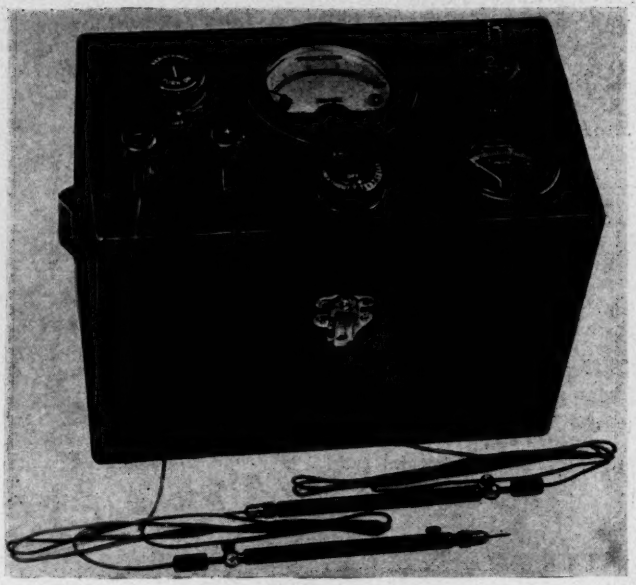
Contemporary Ophthalmic Literature 63

All original communications should be addressed to the Editors, 24, Thayer Street, London, W.1

PORTABLE CATHOLYSIS APPARATUS

FOR THE TREATMENT OF RETINAL DETACHMENTS

The illustration depicts a portable apparatus recently devised for the method of treating a detachment now being used by many surgeons. It is claimed that treatment by this method involves no serious loss of vitreous, and as a very small amount of current is used a minimum amount of scarring of the retina results.



The apparatus is fitted with the necessary resistance to give a finely controlled current from a long life dry cell battery with an efficient milliamperemeter. The appartus is also useful for other purposes for which a similar current is employed such as epilation of the lashes and therapeutic treatment. Any suitable needles may be used with this apparatus which is self contained and very portable. The dry cell battery is easily procurable and can be replaced at small cost.

PRICE :
In mahogany case, as illustrated,
£7 14 0
Needles, holders, etc., extra.

THEODORE HAMBLIN LTD
DISPENSING OPTICIANS
15 WIGMORE STREET,
LONDON, W.1.

THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

JANUARY, 1937

COMMUNICATIONS

OPHTHALMOLOGY AND RESEARCH*

BY

SIR JOHN PARSONS

LONDON

THE members of this Academy all belong to highly specialized branches of medicine. The unparalleled increase of scientific knowledge in modern times has inevitably led to the growth of specialism in every department. The day of the Admirable Crichton has passed for ever. It is futile to shut one's eyes to this fact, as is often done. On the contrary the position must be faced boldly, for specialism undoubtedly has its dangers, which must be studied and circumvented. It seems to me that the welfare of mankind in the immediate future depends more upon co-ordination of existing knowledge than upon the acquisition of new knowledge; and in many respects the former is the more difficult task—the latter is quite able to take care of itself, at any rate in the domain of the physical sciences.

Most of the papers and discussions which we hear at such meetings as this are of a highly specialized nature. An address such as that you have done me the honour to ask me to deliver is an opportunity for surveying a broader field, of attempting a synoptic view.

The reactions of every living animal, upon which its survival

* Delivered before the American Academy of Ophthalmology and Oto-laryngology on September 28, 1936.

depends, are responses to the impacts of various forms of physical energy derived from its environment. In the lowest forms of life the response to any adequate stimulus is a crude tropism. Evolution to a higher plane in the animal scale is associated with, and indeed determined by, increased differentiation of the receptive organs and correspondingly increased differentiation of the resultant responses. In the higher animals the differentiation has led to the development of many receptors, far more numerous than the classical five senses of man. All these receptors are receptors of physical stimuli, whether derived from the outer world or from within the body. The receptors for mechanical stimuli are not confined to those of the tactile sense proper. In fishes the elaborate lateral line system responds to differences of pressure in the surrounding fluid medium, and hearing, both in fishes and higher animals, is but a further sublimation of response to rhythmical pressure changes in the surrounding medium. The proprioceptive receptors in the muscles, tendons and joints are but endogenous receptors of mechanical changes in tension of the parts. There are a host of chemical receptors—true chemical receptors in the mouth and on the body of fishes, almost atrophied to mere vestiges in man, further elaborated into taste and smell organs both in fishes and higher animals, for in both of these the actual stimulus is chemical. Many such occur in the organism itself, for hormones were first revealed as chemical stimuli, although their function does not end there. Perhaps the most remarkable of these are the chemical products of nervous activity which themselves act as stimuli in the synapses and end organs in the form of histamine, acetylcholine, etc. The receptors of radiant energy subserve responses to change of temperature, but the most "glorified heat spots" to use Sherrington's dramatic term, are in the retina and subserve vision.

The simplest response of the animal to a physical stimulus above the level of a mere tropism is reflex action. Here the stimulus excites an end-organ, gives rise to an afferent nerve impulse which is transmitted through one or more intercalary cells to an effector cell, an efferent nerve and an effector organ. Chemical activity seems to dominate every step in the process. In some cases it is definitely the intermediary between the stimulus and the nerve impulse; perhaps the best example is the pupil reflex to light where the optic nerve impulse is started by a photochemical substance, visual purple or other such. Every nerve impulse in every nerve is invariably associated with an electrical response, which is probably the manifestation of ionic activities and therefore chemical in character. The discovery of adrenaline, histamine, acetylcholine, etc., indicates that every synapse and every neuro-effector junction is the seat of chemical activity.

The fundamentally important part played by reflexes in even the highest animal economy has been exhaustively studied by Sherrington and his pupils. They have shown how, as the result of summation, facilitation, inhibition, and so on, the most complex and apparently purposive responses are brought about. Indeed they have done much to bridge the gap between the activities of the lower levels of the nervous system and those higher levels which subserve conscious life.

At some point in this chain consciousness arises. Of consciousness we have no criterion but our own individual experience. In man reflex acts are unconscious acts, but higher activities at any rate show some analogy to reflex acts. The constellation of physical stimuli arouses perception of an experience suffused with meaning, which in turn arouses a conation towards the appropriate response. It is probable that lower in the phylogenetic scale the reflex act is associated with a crude undifferentiated sentiency.

We are accustomed to associate a particular sensation with the response of one of the higher so-called sense organs—touch with with a tactile organ, hearing with the ear, vision with the eye, and so on. But just as a pure reflex is a physiological abstraction so is a simple sensation a psychological abstraction. It is true that in a given experience one sensation may be so predominant as to mask the complication produced by the others. Indeed, one sensation may be predominant in the life history of an animal, and upon it, its survival may appear to depend. Thus it is certain that in many animals such as the dog, the sense of smell is prepotent, and there is little doubt that one of the most important factors, if not *the* most important factor in the supremacy of the primates and man, was the development of the prepotency of vision. None the less the meaning of an experiential presentation—to use psychological language—is derived from the presentation as a whole, and this is an integration of all the sensations derived from all the incumbent stimuli. This "pluri-receptive summation and interference" (Sherrington) by means of which the reactions of receptors of different modality are integrated is a biological mystery. There is indeed a similar integration on a higher level than this perceptual plane, for the presentation as a whole forms a pattern (Gestalt) which possesses meaning which cannot be explained by the mere algebraic summation of its parts.

From these introductory remarks it will be gathered that the study of normal vision demands no small knowledge of physics, chemistry, physiology, neurology, and psychology. As you all know the study of clinical ophthalmology demands also a knowledge of general medicine and surgery, pathology and bacteriology.

The importance of physics is early impressed upon the student,

for, at any rate in the early part of his career, the correction of errors of refraction will be his chief source of income. He must therefore know a good deal about optics, for nature has ordained that the end organ of vision shall be constructed on the principles of a photographic camera. The curious psychological fact must have struck most teachers that medical students are inherently averse from mathematics. My own experience is that they will show an intelligent interest in geometrical proofs, but that they jib at an algebraical or trigonometrical expression. This is the more to be deplored in that opticians as a rule have had to submit to a much more intensive training in the theory of optics. I once expressed my regret to a distinguished physicist that many ophthalmic surgeons had a very elementary idea of the optics of retinoscopy. His reply was that one need not be a watchmaker in order to make good use of a watch. Admitting the cogency of this argument, the fact remains that the most efficient use of the ophthalmoscope, the slit-lamp, corneal microscope, etc., can only be attained by the thorough knowledge of the underlying optical principles. *Verbum sap.*!

The problem of visual acuity is primarily a purely physical problem and was first elucidated by astronomers. The discrimination of two points is simply the problem of the resolution of an optical instrument, and depends like it upon the formation of images by an approximately homocentric optical system with spherical and chromatic aberrations and diffraction at the margin of the pupil, and a receptive screen with a definite size of grain. But when all the physical conditions have been thoroughly established it is still found that the eye is a living organ and does not behave quite like a camera or a telescope. Though the physical conditions remain stationary the eye behaves differently in different circumstances. Thus it is found that there is a very much higher sensitivity to contour discrimination than to the resolution of two points of light. Whereas the former is of the order of a visual angle of at least 30 or 40 seconds of arc the latter is as low as 4 or 5 seconds of arc. This fact cannot be explained on purely physical grounds. The sensitivity of the receptive screen, the retina, and the mutual physiological inductive changes (contrast effects) which are set up in neighbouring areas of the retina result in a discriminative capacity which far exceeds that of any other sense organ in any animal. Fortunately for the physicists they discovered this fact empirically long ago and by means of the vernier applied it to their measuring instruments. Hence the extreme accuracy of physical measurements to which this form of discrimination can be applied, and their inaccuracy when it is not applicable, as in photometry. Physicists in their gibes at biological research often forget that their own criteria are themselves based on biological data.

The presence of an intermediary chemical activity between the physical stimulus and the nerve impulse in vision may be regarded as proved by the discovery and investigation of visual purple. It is true that this is positively proved only for scotopic vision *i.e.*, vision under dark adaptation and weak light. It is almost certain that the much more complicated phenomena of photopic vision under light adaptation and greater intensities of light are also due to photochemical intermediaries which have not yet been isolated. The activities of adrenaline, pituitrine and other hormones and of histamine and acetylcholine suggest that there is a chemical intermediary in all cases of nerve excitation.

The researches of Keith Lucas, Adrian, A. V. Hill and others have educed some fundamental facts in the chemistry and physics of the impulse in the nerve. Every nerve impulse is accompanied by rhythmical changes in electrical potential, and these are of the same nature irrespective of the type of nerve—whether motor, sensory, proprioceptive, etc. The response is of the all- or -none type, *i.e.*, a stimulus causes a maximum response or none at all, and there is a refractory state during which a stimulus of any strength is ineffective. Increase of intensity of the stimulus increases the frequency of the waves of response but does not affect their amplitude.

The electrical responses which accompany stimulation of the retina are much more complex, as might be expected, since a chain of several neurones is involved. The study of the electroretinogram of late years, especially by Granit and his colleagues, has thrown much light upon the highly complex functions of the retina. In typical form the curve shows a latent period, a small negative change of potential (*a*); a sharp rise of potential (*b*); a gradual fall followed by a slow positive wave (*c*); and a positive rise (*d*), when the stimulus is removed. There is little doubt that these complex waves are the integration of at least three waves, one negative and two positive.

The Purkinje experiment proved long ago that the visual impulse starts in the neuroepithelial layer of the retina. It then passes through the bipolar cells to the ganglion cells whose processes end in the primary optic centres, whence another neurone carries the impulses through the optic radiations to the occipital cortex. It is attractive to regard the neuroepithelium as analogous to the epithelial end organ of a tactile nerve; the bipolar cell as a neurone of the first order analogous to the posterior root ganglion cell; the retinal ganglion cell as a neurone of the second order analogous to the mesial fillet; and so on. It must, however, be remembered that the retina and optic nerve are embryologically parts of the central nervous system, and there is now ample evidence to show that many of the functions of the retina can be best explained by bearing this fact in mind.

The evidence of the extraordinarily high discriminative capacity of the fovea shows that there is a strict dissociation of the impulses derived from neighbouring cones. The anatomical basis of this dissociation is found in the fact that each foveal cone has its own individual bipolar cell and ganglion cell—whereas in extra-macular regions several rods and cones form synapses with one bipolar cell, and several bipolars with one ganglion cell. At the same time there is evidence even in the macular region that summation of impulses can occur between neighbouring areas of excitation, and this is far more marked in peripheral regions of the retina. Thus it has been proved that such summation occurs by visual tests and also by the electrical responses in the retina and nerve. It was proved by Riccò and has been amply confirmed that the threshold stimulus in the macular area depends upon the quantity of light, *i.e.*, the same quantity of light may be concentrated in a small spot or spread over a larger area. The anatomical basis for the summation is to be found in the amacrine and horizontal cells of the retina. So far as foveal vision is concerned these facts appear to be contradictory, and can only be reconciled by physiological explanations. The minute discrimination of foveal vision demands an inhibition of the summation which occurs in different circumstances. All the facts of spatial induction (simultaneous contrast) prove the reciprocal action of neighbouring areas of the retina upon each other when stimulated; and that this reciprocal action takes place in the retina and is not at any rate entirely dependent upon activities in the higher centres is proved by the effects of such stimulation upon the electrical responses. We owe to Granit the most exhaustive experimental proof of the facilitation, summation, inhibition, etc., of impulses in the retina just as they were proved by Sherrington and his pupils to occur in the spinal cord.

That these facts are not merely of academic interest is shown by the complex phenomena of vision experienced in every day life. It is only as the result of recent experiments that we are obtaining some idea of the causation of the evil effects of glare in interference with visual acuity and the production of discomfort, headache, and so on. By the careful experiments of Stiles, a physicist at the National Physical Laboratory, a numerical criterion of the effects of peripheral illumination on central vision has been obtained.

The persistence of vision as the result of momentary stimulation by light shows that the retina acts differently from a photographic film. The response to a single short stimulus is a series of waves of sensation, several of which may in favourable circumstances rise above the threshold and give rise to recurrent vision. Repeated short stimuli give rise to flicker which fuses into a continuous sensation if the repetitions occur sufficiently often. It has

been found that the critical frequency at which flicker disappears is dependent entirely upon the brightness of the resulting sensation and is independent of the wave-length of the light. This is the Ferry-Porter law which holds good for central vision, but when the critical frequency of flicker for peripheral regions of the retina is measured under different conditions of central and peripheral illumination complicated results are obtained, as has been shown by the admirable experiments of Lythgoe and Tansley. All these results show the importance of reciprocal activities of various parts of the retina; and some of them seem to indicate that the activities initiated in the cones may have an inhibitory effect upon those initiated in the rods and vice versa.

The visual phenomena to which we have already referred show that the eye must be an efficient optical instrument. That this may be so the media through which the light passes must be transparent, and the curvature of the cornea must be kept constant. In order that the latter requirement may be fulfilled the pressure of the fluid contents of the eye must be kept practically constant and above the atmospheric pressure, so that the walls of the globe may be kept in state of tension. The transparency of the media demands that the cornea and lens shall be free from blood vessels, and therefore some mode of nutrition independent of proximity of blood vessels shall be provided. Since the nutrition of the lens and vitreous depends upon the intra-ocular fluid a stagnant fluid at constant pressure, which would suffice to keep the tension normal, will not suffice to keep these structures healthy. Movement of some kind or other must occur in this fluid.

The theory of the formation of the intra-ocular fluid which has held the field up to recent times is the filtration theory which is specially associated with the name of Leber. Clinical observation and experiments on animals seemed to prove that no process of true secretion occurs, and that the facts are adequately explained by the difference between the intracapillary and intra-ocular pressure. It is not to be supposed that the earlier investigators ignored other possibilities, such as the importance of osmotic changes. For my own part, after reviewing all the evidence available at the time, I always taught my students that the facts appeared to be "not inconsistent with" the filtration theory. Evidence has accrued of recent times to show that osmotic interchange is more important than was once thought. Much of this evidence depends upon minute physical and chemical measurements which are perilously near the border line of experimental error. I am always rather suspicious of chemical weighings carried to four places of decimals! At the same time it must be admitted that our knowledge of colloid chemistry has increased so much that the body of evidence in favour of the intra-ocular fluid being a simple dialysate

is much stronger than it was. Perhaps one of the strongest arguments is the greater concentration of chlorides in the aqueous as compared with the blood plasma, for on the dialysation theory one would expect negatively charged ions to be driven through the capillary walls in order to maintain thermodynamic equilibrium with positively charged colloid ions (proteins) in the blood.

The natural enthusiasm which these results merit and have received tends to obscure the rôle which filtration plays in the process. For though these biophysical and biochemical reactions must now be admitted to be fundamental to the process of lymph formation they are completely explanatory—if that—of only static conditions. Under those conditions the intra-ocular pressure represents the resultant of the intracapillary pressure (say, 50 mm. Hg) minus the difference between the osmotic pressures of the aqueous and plasma (30 mm. Hg) *i.e.*, 20 mm. Hg. But the intra-ocular pressure is never static. It follows passively normal changes in the blood-pressure due to pulse and respiration. It undergoes large rises due to activity of the extrinsic ocular muscles and the movements of the lids. Large changes in the general blood-pressure are accurately reflected in it except in so far as they are modified by local vasomotor and chemical effects. If, however, the general changes persist, as in cases of hyperpiesis, compensation occurs and the intra-ocular pressure resumes its normal level. Convection currents are also set up in the anterior chamber owing to the difference in temperature between the iris and cornea.

Hence the atomic and molecular changes which have been proved to occur are associated with molar changes which alter the hydrostatic conditions. These are specially marked under abnormal conditions. If the aqueous is evacuated, *e.g.*, by paracentesis, the capillaries dilate, their walls become more permeable and filtration of fluid takes place. The fluid thus formed more nearly resembles the blood-plasma in containing more protein than the normal aqueous. If again the eye is massaged the intra-ocular pressure falls. Seeing that this pressure is dependent upon the volume of the contents of the globe and the other conditions are not materially altered, the fall of pressure must be due to the mechanical expulsion of fluid from the eye. Cases of secondary glaucoma indicate the chief site of exit, for in them the angle of the anterior chamber is blocked. There can be no doubt that the rise in intra-ocular pressure which occurs in secondary glaucoma is due to blockage of this " filtration angle," whereby the aqueous is denied free access to the canal of Schlemm.

It has been shown that if the intra-ocular pressure is raised so as to exceed that of the venous pressure the veins collapse. This results in a reflex rise of arterial pressure so that the circulation is restored. The process may in some cases be repeated until the

intra-ocular pressure is equal to the arterial pressure, and the circulation stops. The canal of Schlemm, however, is a venous channel in the substance of the cornea, and therefore does not collapse even when the intra-ocular pressure is moderately raised. Filtration can therefore occur through its inner wall—unless the latter is rendered impermeable by adherent iris, etc.—and an exit is thus provided for the excessive fluid and the normal intra-ocular pressure is restored. The meridional fibres of the ciliary muscle are inserted anteriorly into a scleral " spur." There is reason to think that when this muscle contracts on accommodation it pulls the spur backwards, thus tending to keep the canal of Schlemm open.

The permeability of the capillaries is increased in inflammatory conditions, *e.g.*, iridocyclitis, and a plasmoid lymph, rich in protein, is formed. This causes a rise in intra-ocular pressure, and there can be little doubt that, since in these cases the filtration angle is not otherwise obstructed, and is indeed generally abnormally open, the high tension is due to the difficulty of filtration of the large moleculed colloid proteins into the canal of Schlemm.

Many other facts might be adduced to show the importance of filtration in the maintenance of normal and the relief of abnormally high intra-ocular pressure. Neither dialysation nor filtration, nor both together, suffice to explain all the facts of normal and abnormal intra-ocular pressure. The dialysation theory has to fall back upon the variable permeability of the capillary walls in the various tissues of the body to explain the differences of lymph-pressure and constitution; and this variable permeability is at present only explicable on teleological grounds.

The long established explanation of the mechanism of secondary glaucoma depends upon the application of the filtration theory to the anatomical conditions found in these cases. Even the most ardent advocates of the osmotic theory of the formation of the intra-ocular fluid regard the so-called " filtration angle " of the anterior chamber with the canal of Schlemm as the principal site of exit of the fluid and in general concur in the accepted view for secondary glaucoma. The very ingenious theory of Priestley Smith for the explanation of primary acute glaucoma also involves blockage of the exit channels. The constriction of the circumlental space in the hypermetropic eye by the continued growth of the lens is insufficient in itself to bring about the crisis, which is said finally to be due to venous congestion of the ciliary processes. Recent biochemical work tends to lend support to this exciting factor, for it has been shown by Dale and others that histamine-like bodies are found normally in many tissues of the body and are produced readily by antidromic impulses in nerves (*cf.*, Lewis's " triple response " in the skin). These bodies produce dilatation

of the capillaries, and are liberated by all forms of radiant energy. Duke-Elder has shown that the histamine-like response can be obtained in the albino rabbit's iris by stroking it and that the more widespread axon-reflex is abolished by cocaine—a typical example of the triple response.

Priestley Smith's theory, however, does not explain the not infrequent cases of acute glaucoma in myopic eyes, and fails entirely to explain cases of chronic glaucoma. No one with wide experience of the latter disease can be satisfied with the tentative explanations which have been advanced. The treatment of such cases by trephining, etc., has been founded upon the theory of blockage of the filtration angle, and in spite of its crudity and empirical nature is fortunately successful in preserving vision in a large proportion of cases. There are other cases in which it quite unexpectedly fails. There are, moreover, many cases in which increased intra-ocular pressure is never proved, and the presumption that it occurs is merely a slavish adhesion to current dogma. I have had rare cases of deep cupping in both discs, with full fields and normal visual acuity persisting for several years, yet eventually developing paracentral scotomata and finally constriction of the nasal fields. One must conclude that chronic glaucoma is not a single entity but embraces cases in which the aetiological factors are different.

Recent biochemical researches on histamine and similar metabolites and on the nature of the vitreous suggest possibilities which only further research can prove or disprove. Specially interesting in this connection is the chronic primary glaucoma associated with epidemic dropsy met with in India. In the 1934-5 epidemic 1,695 cases were treated in Calcutta (Kirwan). Although the disease is regarded as due to feeding on stored, par-boiled rice, it is quite different from beri-beri, and cannot be regarded as a deficiency disease. The interesting fact from the present point of view is that Kirwan found evidence of large amounts of histamine or at any rate an " H-substance " in the aqueous humour of a large proportion of the 23 cases he was able to examine. The albumin in the aqueous was also increased so that the ratio of albumin to globulin, which is normally 0·44 to 1·0, was in the ratio of 2·3 to 1·0, the crystalloids remaining normal.

I shall refrain from further discussion of these metabolites in this connection because I must confess that the independent variations in the calibre of the capillaries which have been proved by Krogh and others have introduced further complexity in estimating the hydrostatic conditions in various parts of the vascular system.

The work done on the vitreous has been almost as revolutionary as that done on the intra-ocular fluid. Like it I do not think it is

as revolutionary as appears at first sight. It may be considered as proved—at any rate for the sake of argument—that the vitreous is a gel, and that the fluid which constitutes the sol is in every respect identical with the aqueous. The latter fact conforms with the filtration theory. It is stated that the greater concentration of micellae at the periphery, etc., is in itself sufficient to account for the " structure " which has wrongly been described as a hyaloid membrane; and that similar concentrations and coagulations elsewhere account for slit-lamp and histological " structures " which have been described in the interior of the vitreous. It is to be remembered, however, that the foetal vitreous originates from definite structures derived from the retina, and is full of blood vessels derived from the central artery of the retina and comprising the hyaloid artery and veins. It can scarcely be doubted that the fibres of the suspensory ligament are permanent relics of embryological structures and are not due simply to micellar aggregations. Normally the hyaloid vascular system disappears and the vitreous gel which replaces it is an inert non-vascular jelly nearly resembling the jelly-like material which is formed by the degeneration of the granulation tissue of a so-called Meibomian cyst.

So far as the non-ionised constituents and the albumin and globulin in the vitreous are concerned they are in identical proportion with those in the aqueous. The vitreous, however, also contains a mucoprotein and residual protein, and it is upon these that its behaviour as a gel depends. The investigations of Baurmann, Redslob, Duke-Elder, and others have shown that these proteins have two iso-electric points at about pH 4 and pH 9, and it is upon these that the turgescence and deturgescence of the vitreous gel depends. The maximum change of volume of fresh vitreous gel occurs at about pH 8 to 9, and consequently we may expect that the volume of the vitreous is increased if the fluid contents are abnormally alkaline. Investigations of the alkalinity of the blood in chronic glaucoma have led to conflicting results, but it can scarcely be doubted that the considerable pressures exerted by a swollen vitreous may be an important factor in the pathogenesis of glaucoma.

The crystalline lens, like the vitreous, is a non-vascular organ, and like it is not susceptible to inflammation, so that the old terms hyalitis and phakitis imply ignorance and should be discarded. The chief pathological condition met with in the lens is cataract, and clinical observation over many years has led to the accumulation of a vast body of information as to the types of cataract and the concomitant conditions under which they occur. None the less our ignorance of the fundamental causation of cataract is abysmal. There can be little doubt that the solution of the

problem depends upon the discovery of the normal metabolism of the lens and the factors which lead to its upset. Hence it is not surprising that a large amount of attention has been devoted to the biochemistry of the lens, and the remarkable advance which has been made in biochemical methods of recent years has led to the revelation of many facts which cannot but be of fundamental importance in spite of the fact that they cannot at present be co-ordinated into a satisfactory theory.

The most important chemical constituents of the lens are the salts and proteins. Spectroscopic examination reveals many metals, of which the most important are sodium, potassium, and calcium. The potassium content diminishes with age, but the calcium is relatively constant (Adams). The normal lens contains more potassium than sodium, the reverse of the aqueous. It contains more potassium and phosphorus, less sodium and chloride, and the same amount of calcium as blood serum. The proteins consist of euglobulin, and α-, β-, and γ crystallins. β-crystallin is soluble in water and decreases with age, a factor in the normal process of sclerosis of the nucleus of the lens. The crystallins are rich in tyrosine, cystein, and leucine—amino-acids which tend to form melanins on exposure to ultra-violet light, thus accounting for the normal and pathological pigmentation of the lens.

Owing to the absence of a blood supply the lens is dependent for its metabolism on an autoxidation system which has been proved to be identical with that which occurs in muscle (Hopkins). It is carried out by means of a reversible oxidation—reduction reaction, the catalytic agent of which is a cystein-like substance, probably identical with the glutathione found in muscle. This substance contains an SH group, which on oxidation changes into a SS group. Thermostable substances, of which the chief is probably β-crystallin, effect reduction of this product (SH = SS).

In senile cataract the potassium almost disappears, and the calcium may be eight times the amount of the normal (Adams). The total protein and β-crystallin are diminished. α-crystallin is most easily precipitated and is peculiarly sensitive to precipitation by calcium (Tsuji); its coagulation is probably the chief cause of the opacity in cataract. Glutathione diminishes and finally disappears. In senile cataract there is no significant change in blood-sugar, as compared with the increase which is concomitant with diabetic cataract, nor in the calcium content, as compared with its diminution in tetany and aparathyroid cataract.

Biochemically the essential factor in cataract is the coagulation of the proteins, and many important factors in this process have been discovered in recent years. In general, coagulation of proteins occurs in two stages; (*a*) denaturation, probably by hydrolysis, whereby the colloidal system becomes more labile; (*b*) agglu-

tination. Any form of radiant energy—heat, luminous, ultra-violet, radium—can cause coagulation. Ultra-violet rays alter the permeability of the lens capsule (Duke-Elder), diminish the efficiency of the autoxidation system (Adams), and render the proteins more vulnerable to variation in hydrogen ion concentration and salt concentration, *e.g.*, calcium (Burge). Changes in the capsule cause alteration in osmotic pressure and hence in concentration of electrolytes. Deformation of the fibres leads to mechanical strains. Further, the lens proteins are organ specific, especially α- and β-crystallins, but investigations of their serological properties have proved contradictory. The relative parts played by these factors in the development of various types of cataract are obscure, and have not yet led to any satisfactory prophylactic or therapeutic results.

Apart from the experimental production of cataract in animals by various forms of radiant energy it is easily produced in rabbits by administration of naphthalene and other allied poisons; dinitrophenol, for example, used for slimming, has produced posterior cortical cataract in girls. The occurrence of cataract in tetany, due to parathyroid deficiency when correlated with the excess of calcium in cataractous lenses, suggests a definite association with the rôle of calcium in metabolism. Bourne and Adams found that the blood calcium was fundamentally unchanged by prolonged naphthalene dosing in rabbits. Yet they have shown conclusively that the blood calcium may determine the effect of naphthalene on the eye; for an oats and cabbage diet, which prevents naphthalene cataract, causes a high blood calcium, and is associated with the deposition of crystals, probably calcium oxalate, in the retina; whereas a bran and carrots diet causes cataract and toxic symptoms in conjunction with naphthalene, and is associated with a low level of blood calcium. Recently Yudkin and Arnold have produced cataract in albino rabbits by administration of lactose or galactose, the latter being the more potent; this can be explained by disturbance of calcium metabolism.

I think I have given sufficient examples to show that laboratory experiments have materially advanced our knowledge of the physiology and pathology of the eye. Many other advances of a similar but more general nature doubtless have a distinct bearing on ophthalmological problems. Thus Tansley and others have proved conclusively that vitamin A is essential to the metabolism of visual purple. It is easy to produce night-blindness in rats by deprivation of this vitamin in their diet; and indeed, Charpentier, working with Granit, has used these animals for the purpose of analysing the electroretinogram. E. Mellanby's researches have shown that avitaminosis produces widespread changes in the nervous system, especially in the afferent nerves

and this may have a bearing on the aetiology of retrobulbar neuritis, whether as a manifestation of disseminated sclerosis or not, and possibly upon the aetiology of some lesions associated with the trigeminal nerve. It is by no means improbable that the metabolism of the eye structures is profoundly modified by disturbances in the internal secretions of glands, such as the thyroid, pituitary, adrenal, and the genital glands. Polyhormonic preparations have, indeed, been recommended as a cure for incipient cataract by Siegrist and others. Most competent observers have pronounced this method of treatment as a complete failure. In spite, too, of the immense amount of work which has been done on immunology the practical results must be regarded as disappointing. *Parturiunt montes, nascetur ridiculus mus.* We may all agree that vaccine treatment is often beneficial, and sometimes curative, but there is a lamentable discrepancy between the frequency of its application and the successful results.

These advances in knowledge have by no means been neglected by clinicians, and praiseworthy attempts have been made to apply them to clinical problems. Great ingenuity and great perseverance have characterized these efforts. Only too often enthusiasm has outrun discretion, and the earlier reports of startling success have been followed by discouragement and ultimate admission of failure—or more commonly, silence. For my own part I am convinced that the future advance of ophthalmology, and indeed of medicine in general, can be attained only by persistent pursuit of these more purely scientific efforts correlated with careful and equally truly scientific clinical observations.

For it must be carefully borne in mind that scientific research is a method and a mode of logical thought vitalized by intuition and imagination. Though many, perhaps most, of the outstanding discoveries of science have been made in the laboratory, scientific research is emphatically not the perquisite of the laboratory. If such were the case astronomy could not be classed among the sciences in spite of the fact that it owes so much to laboratory discoveries. The physical processes which underlie most biological problems are so complex that few of these are solved by what I have elsewhere termed the " synthetic " method. The fact that a cataract can be produced by the application of radiant energy does not solve the problem of cataract. We learn most about cataract by clinical observation and experimentation, *i.e.*, by accurate correlation of the relationship of complex conditions. Just as psychological problems are rarely explicable upon a purely neurological theory, so biological problems are rarely solved by purely physical methods. Both modes of approach can be made truly scientific, and the scientist should admit that his scorn of empiricism is not wholly justified.

Every case which we are called upon to treat is a biological problem, and we are paid fees for the express purpose of investigating these problems. Whether we do so scientifically or not is a matter of method; and whether we make any great discovery or not is not even solely a matter of scientific training, but depends also upon inborn factors in the observer, such as imagination and intuition. For intuition, unscientific as the concept appears to be, surely plays a large part in scientific discovery. How did Gonin get the idea of sealing up the holes in a detached retina? If it was pure chance he is still to be credited with the discovery that only in those cases in which the holes were sealed up the retina became attached.

Discoveries have indeed been made as the result of action upon entirely false premises. Such was von Graefe's discovery that iridectomy affords a cure for acute glaucoma. He first performed the operation on the theory that iridectomy, often performed in those days for optical purposes, reduced the normal intra-ocular pressure—a wholly erroneous observation.

Our knowledge of the physiology of the normal intra-ocular pressure is still very scanty, and that of pathological increase of tension still more so, yet considerable success has been obtained in the treatment of chronic glaucoma by the many drainage operations which have been devised. If, as I think, they are all very crude methods of dealing with a little understood pathological condition, they at least have the pragmatic sanction that they are often successful in retaining sight. They remind me of Michael Foster's criticism of electrical stimulation of the brain, which he compared to playing the piano with a broomstick.

While we must all be profoundly dissatisfied with the utilitarian results of the application of biochemical and other forms of more "purely" scientific research, and also with the groping advances of hit-or-miss empiricism, we may yet rest assured that unmistakeable progress has been made in our knowledge of ophthalmological problems and in our treatment of diseases of the eye. It is not given to everyone to be a biophysicist, a biochemist, a physiologist, or indeed, a pathologist. For such it is encouraging to know that he also can do useful research work; and it is still more important that all who have to deal with patients should be thoroughly trained in clinical methods, and that their clinical training should not be limited to their own speciality.

Recent numbers of the *Archives of Neurology and Psychiatry* have contained a valuable series of papers on the training of the neurologist and the psychiatrist. The arguments which apply to neurological training apply equally to ophthalmological training: and I cannot do better than quote the words of my colleague,

Dr. F. M. R. Walshe :—"So I believe," he says, "that while technical methods of investigation and experimental studies have now to be included in the essentials of a complete neurologic training, clinical observation remains the foundation of neurologic medicine and on it all else must be built. Only the adequately trained clinical observer can evaluate the relationship of the results of laboratory and other technical methods of investigation to the symptoms of disease presented by the individual patient, for it is the individual that is the material of our study, be it remembered, and not an abstract thing called 'disease.'"

The importance of the training and acumen of the observer is admirably expressed in the words of your great authority on medical education, A. Flexner. He writes, "There is a widespread impression that the scientific quality of medical education and practice is in some fashion dependent upon the part played by the laboratory. This is not the case. Science is essentially a matter of observation, inference, verification and generalization. Not only is the part played by the active senses the essential criterion of science; one may go further, the vast and complicated paraphernalia of science are merely means of extending their scope."

I have no hesitation in stating that in my opinion clinical medicine is better taught, and therefore better practised, in England and the United States than in any other part of the world; and this is largely, if not chiefly, due to the fact that British and American students have not only freer access to the hospital patient than in other countries, but are compelled by careful note-taking themselves to investigate the signs and symptoms of disease and to exercise their own wits in arriving at a plausible diagnosis.

INTRACAPSULAR CATARACT EXTRACTION*

BY

O. M. DUTHIE, M.D.

MANCHESTER

THE problem of intracapsular cataract extraction is not a new one. There is a considerable amount of literature on the subject, much of which is controversial; thus Appleman[1], in discussing a first series of 100 cases, regards the method as being an ideal procedure; de Grosz[2] reminds us that the further results of intracapsular removal must be followed up for many more years and

* Abstract of Paper read at the Manchester Meeting of the North of England Ophthalmological Society, October, 1936.

Duke-Elder[3], writes that before a considered opinion can be given, more extensive and accurate information is certainly required as to the end results.

My own interest was stimulated by the work of Dr. A. H. H. Sinclair[4], published in the *Transactions*. Briefly, his method consists of extraction of the lens in capsule by " tumbling," *i.e.*, by grasping the anterior capsule below and extracting by delivering the lower pole first, necessitating a dislocation of the upper pole backwards. I would emphasize that the results about to be described are based in principle upon Sinclair's method, modified only in minor details.

The series about to be discussed consists of 100 consecutive cases of which 43 were mature and 57 immature. Included in these are three adult zonular cases. Two cases of congenital dislocation of the lens have been purposely excluded, because neither was typical of the method practised; both, however, obtained normal visual acuity after intracapsular removal of the lens, a result very much at variance with the views expressed by de Grosz[2].

A very full description of intracapsular technique is given in Sinclair's paper and I propose to deal here only with certain aspects of the problem as they have presented themselves to me during the course of the last two years.

Local Anaesthesia and Akinesia.—The modifications that have been found of value are:—

(*a*) Retro-ocular injection should be given 20 minutes before operation. There is no doubt that this causes reduction in tension and thereby lessens the risk of vitreous prolapse. In cases 1-58 the lens was removed immediately after injection, and the remainder after allowing time for the globe to soften. I have no hesitation, after contrasting the two methods in advising that preliminary reduction in tension is much safer. This experience confirms the views put forward by Elschnig, but is in direct opposition to those held by Knapp[5] who regards preliminary softening as unnecessary.

(*b*) At the time when the lids are injected, two small subcutaneous areas at the junction of the middle and inner, and middle and outer thirds of the margin of the upper lid are anaesthetised, in order that the retraction sutures may be inserted painlessly.

Lid Retraction.—No speculum or lid elevator is used for purposes of lid retraction. Two sutures are inserted just above the margin of the upper lid and one just below the margin of the lower lid and to these Spencer-Wells are attached. When the sutures are fully stretched the weight of the forceps is sufficient to give a wide palpebral aperture without pressure on the globe.

Corneal Section.—The section must be large. In a certain number of cases the lens can be extracted through a small section, but the size of the lens varies enormously and a large lens with a small section leads to rupture of the capsule as the lens is being delivered. Provided the globe is softened, the section is best made completely with a Graefe knife, and not enlarged with scissors; but where the globe is not softened, there is danger of dislocating the lens if a very large section is made with the knife. A small conjunctival flap is essential.

Extraction.—In order to tumble the lens satisfactorily, the anterior capsule must be grasped well down as near the level of the pupillary margin below as possible. There does not appear to be any single pair of capsule forceps which will suit everyone. Sinclair's cross action ones appear too large and Messrs. Weiss and Sons have made to my order a pair embodying the following features:—

(*a*) Small in size and light in weight.

(*b*) " Splayed out " at the terminal points in order to push the margin of the iris below in front of them.

(*c*) Gripping surfaces modelled on Sinclair's pattern.

(*d*) Cross bars along the shaft, in order to prevent apposition except actually of the gripping surfaces, so that there is no risk of grasping the iris above.

Once the capsule is grasped, it is essential not to hurry. The lens must be rocked gently, and once it is dislocated below, the guard must be brought into action, and more and more pressure exerted on the globe below, until at the moment of delivery the capsule forceps is merely guiding the lens through the wound. Difficulty in delivering always occurs if there is haemorrhage into the wound, and, apart from washing out the anterior chamber prior to grasping the capsule, an effort should be made to obtain haemostasis of the wound edges. This can be aided by instilling a few drops of adrenalin on the wound, prior to washing out. Immediately after extraction the lid sutures should be slackened.

Toilet.—In a certain number of cases, even after reducing the tension, the vitreous tends to bulge and when this occurs gentle pressure should be applied to the globe with the lids closed for 1-2 minutes. If this is done, the wound becomes flat, and a toilet can then be effected. The lids are kept closed by bringing the sutures from the upper lid down on to the cheek, and holding them with strapping for 24 hours. A vaseline dressing is unnecessary.

Iridectomy.—The problem of the type of iridectomy to be performed is a very difficult one. I think peripheral iridectomy is

correct; this is what I did in cases 1-53, but in this number there were 5 cases of low iritis, 3 cases of prolapse and 8 cases of ultimate eccentric pupil. In order to try and prevent the latter, some of the cases were kept on pilocarpine for 48 hours after operation and it was chiefly in these that the iritis developed. With full iridectomy there were 2 cases of iritis and 5 of prolapse; in addition with full iridectomy the operation is simpler because the capsule forceps can be introduced more easily. In so far as the section must be large, the risk of prolapse is great; the ultimate ideal solution is peripheral iridectomy combined with a satisfactory method of closing the wound firmly at once. A conjunctival flap is not enough and superficial corneo-episcleral sutures placed at " 10 o'clock " and " 2 o'clock " would appear to be a method worthy of trial. American surgeons appear to have been faced with this problem of wound closure[6].

Statistics.—A very careful investigation of the end results reveals the following facts:—

(*a*) *Vision.*
61—6/6 or better.
15—6/9 or 6/12.
1—6/18.
1—Counts fingers.
2—No P.L. Lost eyes (1 diabetic—old iritis—high myopia. 1 senile; very bad result).
14—6/12—Counts fingers; high myopes; postr. fundus disease.
6—6/9-6/36; other eye disease, *e.g.*, old glaucoma—retinitis.

Thus, excluding cases where vision is reduced as the result of other eye disease unrelated to operation, these figures represent:—

6/6 or better	77 per cent.	96 per cent.
6/9—6/12	19 per cent.	
6/18	1 per cent.	
Counts fingers ...	1 per cent.	
Lost eyes	2 per cent.	

(*b*) *Complications.*

Retro-ocular haemorrhage ...	None
Corneal blood staining	1
Hyphaema	28
Iritis	7
Iris prolapse	8
Loss of vitreous—at operation ...	4
Loss of vitreous—after operation	2
Detached choroid (with recovery)	1
Detached retina	1
Cyclitis and secondary glaucoma	None

Hyphaema.—The incidence of this condition was extraordinarily high—28 as compared with 11 in a similar series reported by Knapp[7] and in all the severe cases it occurred on the 4th, 5th, or 6th day; its average duration was 13 days. In almost every case there was a history of trauma, but the mild type of trauma which as a rule produces no haemorrhage in extracapsular cases, almost invariably does so in the intracapsular types. It is annoying because it delays convalescence; only in one case was vision interfered with and here corneal blood staining occurred; this was practically absorbed in 6 months' time and the ultimate visual result was 6/12 (the condition arose as the result of using faulty forceps, thereby injuring the posterior surface of the cornea). It is difficult to be sure of the cause of the hyphaema; one explanation is haemorrhage from the wound, which has actually been observed, but a more likely frequent cause seems to be haemorrhage from the ciliary body, as the result of trauma due to traction on the zonule at the time the lens is dislocated.

Loss of Vitreous.—At the time of operation, this occurred four times—one a gross loss entirely due to faulty technique, one a a gross loss in a case in which an exactly similar complication had previously occurred during an extracapsular operation on the other eye, in the third case there was only a bead, and in the fourth fluid vitreous presented as soon as the section was made, but in spite of this the lens was grasped and successfully removed in capsule. Two cases of later loss of vitreous occurred, both associated with iris prolapse. In three cases the vitreous was adherent to the posterior capsule, a condition to which Sinclair has already drawn attention.

Astigmatism occurred in practically every case and varied between 1 dioptre and 5·5 dioptres. The average astigmatic error was 2·5 dioptres.

The average duration of stay in hospital was 19½ days.

No figures can adequately represent the true value of this operation. Though the visual results in healthy eyes are excellent, it is in difficult, secondary cases, and in otherwise diseased eyes, that its value is greatest. It is the method of treatment par excellence in cases of high myopia with nuclear cataracts and vision reduced to 6/36 or less with correction. Many of the complications described are avoidable—particularly those of the iris and vitreous—provided finer technique is evolved. Apart from the risk of complications as the result of irritation of cortex and drag of capsule—which we must accept as being present in extracapsular cases—the clear black pupil gives to an aphakic eye a visual recovery that no other method can consistently claim. The absolute safety with which an immature cataract can be removed is remarkable; these cases are, in fact, simpler, for the capsule is

almost invariably stronger and dimples easily under the pressure of the forceps. Instead of a long period of waiting, followed by a preliminary operation, then extraction (as a rule of a lens with sticky cortex which is left behind to cause severe irritation) and often needling, the patient can, by this method, at any reasonable time, subject himself to an operation which holds out every reasonable prospect of recovery of almost perfect vision. Technically, the operation is slightly more complicated and certain cases can be extraordinarily difficult, but there appears to be no reason why a surgeon who is operating regularly cannot undertake intracapsular extraction with every hope of success. My experience does not confirm the views expressed by Duke-Elder; this method of intracapsular extraction is not essentially difficult, skill in the selection of cases is not required, and the operation does not demand a long apprenticeship and a delicacy of technique not readily attained. Doubts have been expressed as to the value of the complicated technique of local anaesthesia and akinesia; after the experience of these and many other cases, I am convinced of its extreme value, not only in the sense of security it gives to the surgeon, but to the patient as well, particularly if it is explained to the latter that he is no longer capable of sudden movement or squeezing.

One doubt only remains in my mind—whether it is good surgery to adopt an operative procedure which, relatively to its size, produces such a gross anatomical alteration of the eye. My own experience is as yet too limited to form a judgment on the point, but all authorities who have practised this operation to any extent, are emphatic that the ultimate end results are excellent—with the possible exception of the Smith method, and here Thomson[8] was only reporting on 22 cases.

Summary

1. The present paper deals with a series of 100 consecutive intracapsular cataract extraction operations.

2. The results show a final visual acuity, in healthy eyes, of 77 per cent. 6/6 or better, and 19 per cent. 6/9-6/12.

3. The most common single complication is hyphaema—28 per cent.—for which no suitable method of prevention is suggested.

4. Iris prolapse occurred in 8 per cent. and vitreous prolapse in 6 per cent. of cases; suggestions are made with a view to reducing this incidence and at the same time making peripheral iridectomy a safer procedure.

5. Minor points in local anaesthesia are suggested.

6. Superiority of the operation over other methods is claimed, particularly in immature cases.

I wish to express my thanks to Dr. Sinclair, for his kindness in personally demonstrating his operation to me; to my colleagues of the honorary staff of the Manchester Royal Eye Hospital, for permission to operate on many of their cases and to Mr. S. B. Smith, for his assistance in the compilation of the records. Particularly do I wish to thank Dr. T. M. Bride and Dr. H. H. McNabb for their collaboration and helpful criticism of this work.

REFERENCES

1. *Arch. of Ophthal.*, Vol. IX, No. 6, p. 912.
2. *Arch. of Ophthal.*, Vol. II, No. 1, p. 108.
3. Duke-Elder.—Recent Advances in Ophthalmology, 3rd Edition, p. 379.
4. *Trans. Ophthal. Soc. U.K.*, Vol. LII, 1932.
5. *Arch. of Ophthal.*, Vol. X, No. 1, p. 10.
6. *Arch. of Ophthal.*, Vol. XII, No. 1, p. 128, *et seq.*
7. *Arch of Ophthal.*, Vol. X, No. 1, p. 7.
8. Thomson.—*Trans. Ophthal. Soc. U.K.*, Vol. XLV, p. 151.

A CASE OF PERIVASCULITIS RETINAE ASSOCIATED WITH SYMPTOMS OF CEREBRAL DISEASE

BY

A. J. BALLANTYNE *and* I. C. MICHAELSON

GLASGOW

THE case is one of vascular disease in the retina, with recurrent retinal and vitreous haemorrhage, in a young man; differing from the usual cases of this group in the rapid evolution of the vessel changes, and presenting an interesting but somewhat unusual feature in the occurrence of symptoms pointing to disease of the central nervous system.

The man, whose age was 30 years, was seen on December 2, 1935, complaining of dimness of vision in the left eye. Vision in the right eye was 6/6 and in the left eye 6/24. Ophthalmoscopic examination in the right eye showed some widening of the inferior temporal vein which was constricted by the over-lying artery. Otherwise the fundus was normal. In the left eye there were some haemorrhages in the vitreous. The veins showed, in some parts, parallel sheathing, and elsewhere there were sections accompanied by white lines. There were many retinal haemorrhages. The changes were most marked in peripheral parts of the fundus.

A fortnight later the left eye had a large vitreous haemorrhage, and the right eye showed exudates accompanying and concealing the veins, and some retinal haemorrhages. In this eye the exudate

Diagram I.

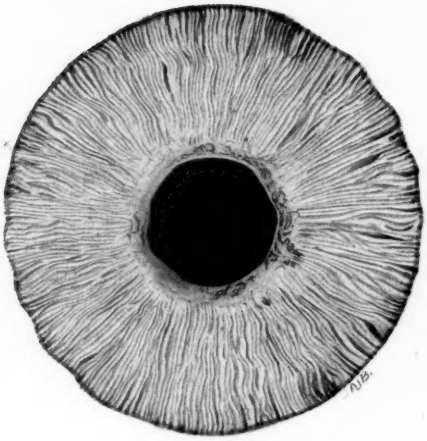


Diagram II.

UNIV. OF MICH.

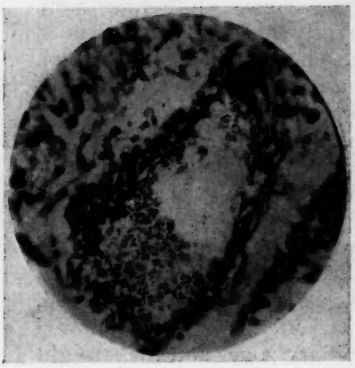
appeared to advance from the neighbourhood of the disc to the periphery. The fundus changes progressed rapidly. The exudate was most marked where two veins were confluent. Haemorrhages, both superficial and deep, increased. Here and there the veins were accompanied and concealed by broad areas of white exudate, and at some points both artery and vein were buried in exudate. Branching, narrow, white lines were seen vaguely here and there, apparently representing occluded blood vessels, but the origin of these, whether venous or arterial, could not be traced. The whole retina in both eyes was oedematous. The nasal vessels became affected later than the temporal ones. A *rete mirabile* appeared on the left optic disc and later, on the right, and the latter extended along the course of the superior temporal vessels. The veins became dilated and in some parts tortuous and beaded. The haemorrhages were not definitely associated with the visible vessels, and vascular changes appeared to be entirely confined to the veins. Diagram I shows the general appearance of the right fundus as it was seen on January 27, 1936.

The iris in both eyes, but more markedly in the left, showed prominent varicose vessels in the pupillary zone, and the straight vessels of the iris were visibly injected. In the left eye a few fine precipitates were visible. Diagram II shows the slit-lamp appearance of the left iris.

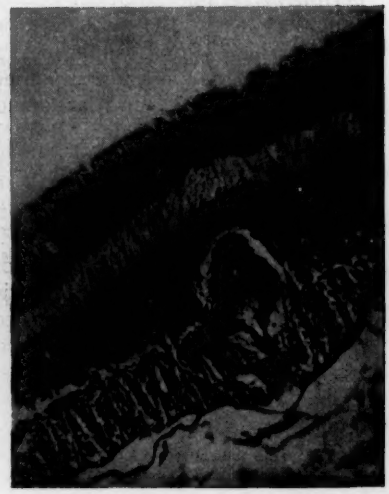
Vision varied from time to time, with the onset and clearing of vitreous haemorrhage, but on February 10, 1936, vision in the left eye was reduced to hand movements. Secondary glaucoma had occurred, and the eye was excised on the 14th. It is interesting to note that the visual acuity of the right eye improved on the day following the enucleation from 1/60 to 6/18. This improvement was, however, temporary.

General examination, which included the condition of the cardio-vascular, pulmonary, urinary and nervous systems was, for the most part, negative. Blood showed a slight preponderance of lymphocytes; blood sedimentation and blood coagulation time were normal. Cerebro-spinal fluid was drawn off under excessive pressure, but was normal in its composition. There was no evidence of pulmonary disease, either on physical examination or in the X-ray photograph. The Wassermann reaction in both blood and cerebro-spinal fluid was negative, but the von Pirquet test was positive to human and bovine tuberculin.

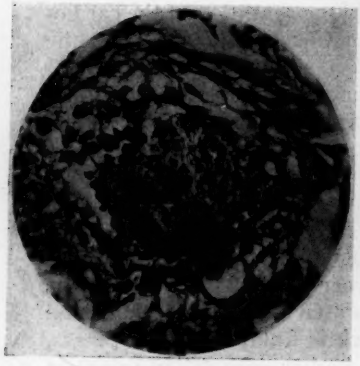
The history showed that for eight years he had been having fits once in two months or so; before each attack his face twitches and everything becomes black. The attack is followed by sleepiness, but this is common at all times, and he has even fallen asleep at his work. There is a tendency to katatonia.



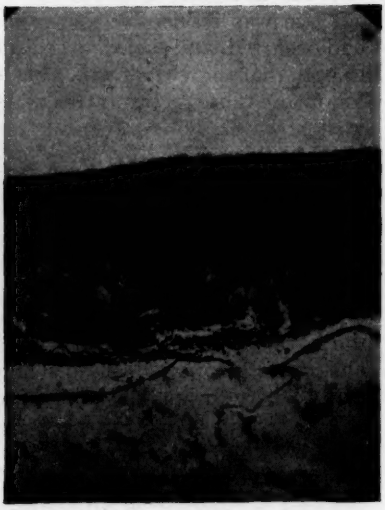
SECTION A.



SECTION B



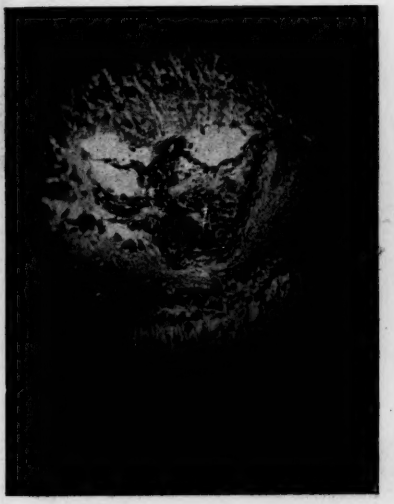
SECTION C.



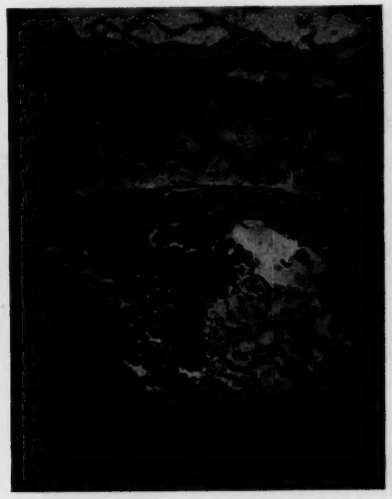
SECTION D.

Sections of the left eye, which was removed on account of secondary glaucoma, show the following changes:—

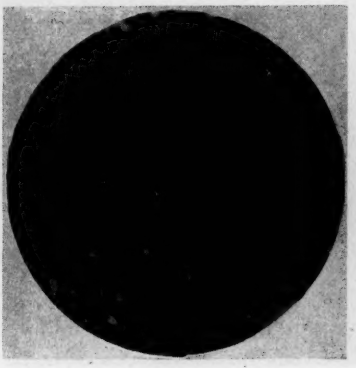
Many of the veins show a greater or less degree of cellular infiltration which, while involving the vein wall only at one part in the early stages, goes on to a complete annular infiltration of the vessel wall. In only a few instances, however, does the exudate extend beyond the perivascular space. Some exudate which appeared to do so could be seen on closer examination to



SECTION E.



SECTION F.



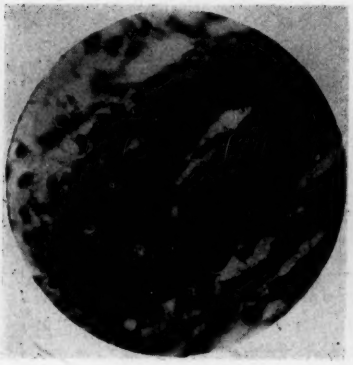
SECTION G.

SECTION H.

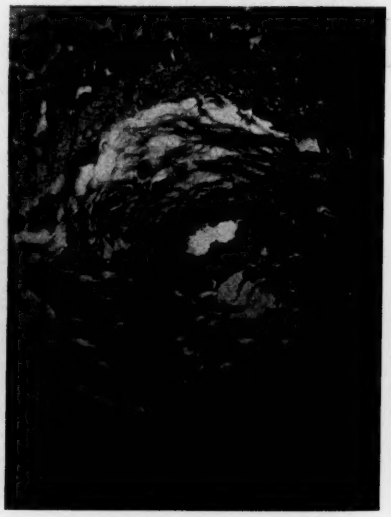
be enclosed within the stretched fibres of the vessel wall. Sections A, B, C, and D show the progressive stages of the infiltration. Section B, which is a typical appearance for most of the veins, shows the freedom of the perivascular space from infiltration. The later stage as represented in section D is a most infrequent appearance. The tendency for the exudate to gather at the bifurcation of the veins as already noted is well seen in section E. In places the exudate is invading the vessel lumen and occluding it.

SECTION I.

SECTION J.



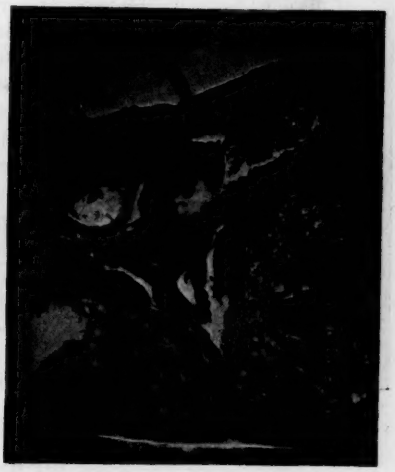
SECTION K.



SECTION L.

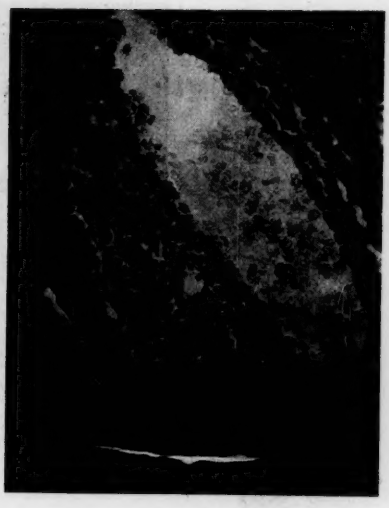
An early stage of this is seen in section F. In other places the exudate has brought about a closure of the lumen of the vessel without apparently interrupting the endothelium. (Section G). The vessel is evidently finally converted into a fibrous knot as

SECTION M.

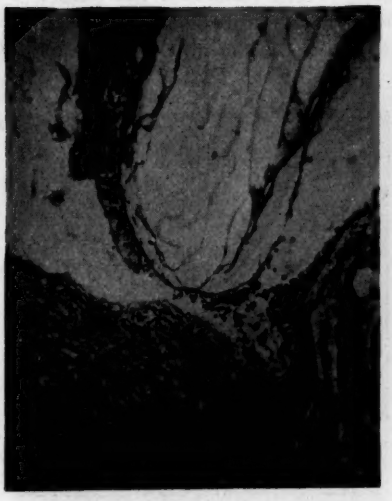


SECTION N.

SECTION O.

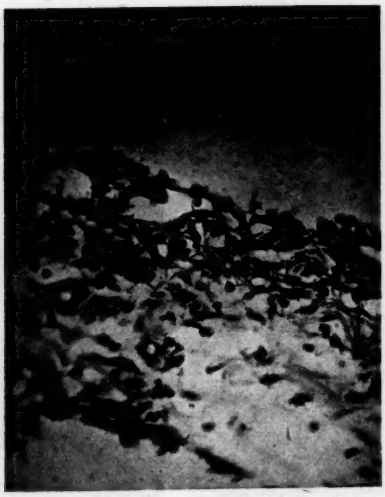


SECTION P.



SECTION Q.

SECTION R.



SECTION S.

seen in Section H. The earlier stages of this progressive involvement of the veins are seen next to the disc while the later ones are near the equator of the globe. In the latter region haemorrhages were abundant. Blood was found not only in the nerve fibre and ganglion cell layers but also throughout the other layers as far back as the external limiting membrane. It was doubtful if haemorrhage occurred among the elements of the rod and cone layer. Blood was also found immediately under the anterior limiting membrane and in the vitreous as far forwards as the ora serrata.

The exudate is chiefly composed of lymphocytic cells. This is seen in sections I and J. Similar cells are to be seen in the blood stream, and in section J three cells are apparently about to leave the blood stream through a breach in the endothelial lining. There is, however, in several veins a proliferation of the endothelial cells. This is seen in section K.

In a few instances the arteries show a similar infiltration of their walls. Early and later stages of this are seen in sections L and M. Both show that the infiltration is at the outset well away from the endothelial lining and yet well confined by the perivascular space.

Sections were made of the optic nerve both transversely, immediately behind the globe, and longitudinally somewhat further back. At one point in the former sections, some cellular infiltration of venous walls was found in the perineurium (section N), while in the longitudinal section, the vein at one point shows a massive infiltration of its walls with narrowing of the lumen (sections O and P, low and high powers).

The histological findings confirm the ophthalmoscopic appearances in that they suggest that the earliest changes are in the periphery of the fundus and the more recent ones nearer the disc. The phlebitis seems to have spread from the minute peripheral veins into the larger ones. The changes in the central vein behind the lamina cribrosa are probably the latest to have taken place and may quite well in time have progressed further towards the base of the brain.

The *rete mirabile* in front of the optic disc was seen to be composed of a few large thin-walled vessels in a matrix which is partly fibro-cellular and partly amorphous. On the surface of this projecting mass, blood vessels were abundant and of small diameter (sections Q and R).

The varicose vessels seen on the iris appeared in the sections as small, thin-walled spaces (section S).

At no point could the accumulation of cells be said to have the characteristics of a tuberculous or syphilitic process. The nature of the exudate, its rapidity, and its mode of spread, suggest that we are dealing with a reaction to some infection.

This case groups itself with a large number that have been variously described, chiefly by Continental observers, as phlebitis, periphlebitis, or perivasculitis of the retina. They have occurred chiefly in the eyes of young adults, usually male. The characteristic features of the group are the white sheathing of the vessels, the age of the patient, and the frequency of vitreous haemorrhages.

We have made an analysis of 68 cases which have been reported in the literature. The average age was 23 years. Only two cases were above 30 years at the outset of the disease. Their ages were 36 and 38 years. One case was under 15 years of age. It was a child of eight months with tuberculous meningitis (Goldstein and Wexler[1]). There were rather more males than females. Although both eyes were frequently affected, the left one was more often affected than the right.

Many authors in reporting their cases state that the lesion is confined to the veins. Others, however, report cases in which the arteries, or capillaries are likewise affected (Axenfeld and Stock[2], Davis[3], Alexjewa[4], Suganuma[5], Marchesani[6]). Although white sheathing of the vessels appears to be the earliest lesion, most authors describe thrombosis and haemorrhages in the fundal pictures. Alexjewa[4] and Axenfeld[2] (second case) report cases in which the circulation was unhindered.

Nine cases have been pathologically examined (Fleischer[7], Axenfeld[8], Eppenstein[9], Suganuma[5], Goldstein[1], Birnbaum[10], Marchesani[11], Gilbert[12], von Hippel[13]). They were all reported to have shown a cellular exudate in the vessel wall or else in its immediate neighbourhood. Thrombosis and haemorrhage were described as subsequent changes.

In our case the fundal appearances show the preponderating rôle of the veins and suggest changes in their walls as the primary condition. The affection is practically entirely confined to the veins. This is confirmed by the histological findings. In only one or two places were the capillaries or arteries affected. The cellular exudate is definitely, at its onset, within the vessel wall, constituting a phlebitis. The term periphlebitis as applied to the retinal veins is not so significant as when used in connection with the veins elsewhere in the body, because they have much thinner coats, have neither a decided adventitia nor vaso-vasorum and have a trace of elastic fibres only in the largest veins.

Many theories of causation have been advanced. The majority of investigators consider tuberculosis to be the cause, while several are of the opinion that the essential pathology is a thrombo-angeitis of the retinal vessels occurring as a localisation of the general condition, thrombo-angeitis obliterans (Bürger). It is suggested that

there is an underlying congenital weakness of the vessel wall (artery and vein), or of the vegetative system, or of the ductless glands, which expresses itself by an inflammatory change in the wall of the vessel. We will consider these opinions in the light of the present case and those already reported.

Tuberculosis as the Cause

Evidence for this theory of causation is based on the pathological examinations of eyes removed and the presence of tuberculosis elsewhere in the eye or in the body. The evidence based on histological findings is complicated by the facts that the presence of giant-cell systems is not necessarily exclusive of Bürger's disease (Bürger[14], Letulle[15], Sigler[16]) and that the absence of giant-cell systems and of the tubercle bacillus is not proof that the disease is non-tubercular in nature. Of the nine cases pathologically examined, seven were described by their authors as probably of tuberculous nature. In two cases the changes were described as typical of thrombo-angeitis obliterans (Birnbaum[10], Marchesani[11]). One case is reported which showed the presence of the tubercle bacillus in the immediate neighbourhood of a retinal vein (Gilbert[12]).

Eight cases have been reported showing the presence of active tuberculosis elsewhere in the eye. (Axenfeld and Stock[3], Fleischer[7], Mayerhofer[17], second case, Lluesma[18], Goldstein and Wexler[1], von Hippel[13], Kokott[19]). These cases showed tuberculosis of the sclera or uvea.

The description " tuberculosis elsewhere in the body " is an extremely ill-defined one. There are three types of cases to which that description is often applied: first the type of case with a positive von Pirquet reaction in an adult with X-ray evidence of a " closed " lung lesion; secondly, the case showing these signs accompanied, however, by a general or a focal reaction on the injection of tuberculin; thirdly, the case with an " open " tuberculous lesion. The first type is of no special significance, the second must be assessed by the clinical experience of the observer, while the third must be considered of first rate aetiological importance.

Seven cases have been reported in which there was a positive, local, focal and general reaction on the injection of tuberculin. (Cords[20], Igersheimer[21], Davis[3], two cases, Nicolate[22], Axenfeld and Stock[3], Natale[23]).

Nine cases have been reported in which active tuberculosis was present elsewhere in the body (Axenfeld and Stock[3], second case, Igersheimer[21], second case, Fleischer[7], Gilbert[24], Mayerhofer[17], Goldstein and Wexler[1], Löwenstein[25], Gilbert[12], Kokott[19]).

Excluding a diagnosis based on purely pathological grounds, we find that 19 cases have a definite clinical association with tuberculosis. This is 28 per cent. of the reported cases which we have investigated.

General examination of the present case revealed no tuberculosis. He had several tuberculin injections, but there was no focal reaction. There was no evidence of tuberculosis elsewhere in the eye. No tubercle bacilli were found in the sections stained for them. The sections showed an infiltration of the vessel wall which was not typical of tuberculosis in so far as there were no tubercle formations and no giant-cell systems. The relatively few endothelial cells present originated obviously from the endothelial vascular lining.

Thrombo-Angeitis as the Cause

The diagnosis of thrombo-angeitis obliterans is based on the presence of symptoms indicating the existence of the disease elsewhere in the body. Marchesani[6] postulates that coldness of the extremities with a tendency to redness or blueness, sweating of the hands and feet, trophic disturbances in the skin and nails, paraesthesia, gangrene, and absence of the pulse in the dorsal artery of the foot are suggestive of thrombo-angeitis. The main defect is a narrowing of the lumen of the vessel, vein or artery, through an overgrowth of fibro-plastic tissue between the elastic tissue layer and the endothelium. The overgrowth of fibrous tissue obliterates the lumen of the vessel.

Six cases have been reported in which vascular disease of the retina was associated with symptoms ascribed to thrombo-angeitis (Birnbaum[10], Marchesani[11], Gilbert[12]). The evidence has been chiefly clinical, although in two instances the diagnosis was supported by the pathological findings (Birnbaum[10], Marchesani[11]); von Hippel[13], however, rightly points out that cold feelings in the extremities, paraesthesia, etc., are quite commonly found in healthy people and that the pulse of the dorsal artery of the foot is very often not easily palpable. The most definite sign of thrombo-angeitis is gangrene. Only four cases have been reported with this symptom. There were no evidences, clinical or pathological, of thrombo-angeitis in the case which we report.

Other Causes

Santowsky[26] reported a case with a positive Wassermann reaction.

Anthonisen[27] reported a case which had carcinoma of the stomach.

Knapp[28] reported a case in which septic tonsils appeared to have an aetiological importance.

Eccheverria[29] reported 6 cases of sympathetic ophthalmitis, which showed a perivasculitis retinae.

As mentioned above the clinical-pathological findings in our case suggest an infection, but there was nothing in the general condition of our patient to indicate the nature of this infection.

The path by which an infection may reach the vein wall has been much discussed. It is variously believed to leave the blood stream through the vein wall, to leave it in the neighbouring capillaries, or else to spread backwards from the uvea. The variability of the path of infection is denoted by the following facts. Six cases have been reported where the peripheral veins were first affected. (Ballantyne[30], Igersheimer[21], Davis[3], first case, Kokott[19]). Five cases have been reported where the central veins were first affected (Davis[3], second case, Alexjewa[4], Gilbert[12], Axenfeld[2], first case, Goldstein and Wexler[1]). Eleven cases have been reported with an accompanying uveitis (Ballantyne[30], first case, Fleischer[7], Davis[3], second case, Nicolate[22], Mayerhofer[17], second and third cases, Axenfeld[2], Goldstein[1], Kokott[19]).

Our case showed no uveitis except at a very late stage. In the first affected eye, the left, the condition began in the peripheral vessels, and in the second eye it appeared to begin near the disc. There is thus no evidence for a consistent mode of entrance of an infection.

Several authors have suggested that the cerebral vascular system is coincidentally implicated, as it very frequently is in retinal arterio-sclerosis. Eleven cases have been reported in which there were symptoms associated with the central nervous system, that is, about 17 per cent. of reported cases (Ballantyne[30], Löwenstein[25], Marchesani and Stauzi). The symptoms have been those of hemiplegia, disseminated sclerosis, tumour, or epilepsy. Our case gave a definite history of fits and showed a well-marked increase in the pressure of the cerebro-spinal fluid. Several physicians who examined him were of the definite opinion that his symptoms indicated a diffuse brain lesion.

Recurring haemorrhage in the vitreous of adolescents (Eales' disease) has obviously much in common with the retinal disease under discussion. Until about 25 years ago it was assumed that the bleeding took place from the anterior uvea. Within recent years it has been considered by almost all observers to be frequently associated with disease of the retinal vessels (Igersheimer[21], Davis[3], Axenfeld[32], Marchesani[6]). The one-time difficulties were that in many cases the haemorrhage was too dense to permit of ophthalmoscopic examination, and that frequently there were no

retinal disturbances to be seen after the vitreous haemorrhages had absorbed. Many cases have been reported, however, with fundus-obscuring haemorrhages in one eye and vasculitis in the other one (Axenfeld and Stock[2], Igersheimer[31], Suganuma[5], Kokott[19]). The absence of retinal disturbances can well be explained by the very brief duration of the retinal changes in carefully watched cases (Axenfeld and Stock[2], four to six weeks, Alexjewa[4], three weeks). Had the case, which we now report, been first seen at a late stage it might quite well have been described as a case of Eales' disease. We may therefore, reasonably assume that our comments on the nature and aetiology of perivasculitis of the retina in young adults apply to at least many cases of recurring vitreous haemorrhages in people of that age.

Summary

A case of perivasculitis retinae has been clinically and pathologically described.

A group of 68 similar cases reported in the literature has been discussed with regard to the clinical facts, the pathological appearances, the aetiology, the path of entrance of an infection, the implication of the cerebral vascular system, and the association with recurring vitreous haemorrhages.

Conclusion

The pathology of perivasculitis retinae in young adults is an inflammatory cellular exudate within the vessel walls, and usually confined to the veins.

A similar condition probably affects some of the intracranial vessels.

Perivasculitis retinae probably frequently manifests itself in the clinical condition described as recurring haemorrhage in the vitreous of adolescents.

The cause is not definitely determined although a good percentage of cases are associated with active tuberculosis.

The case which we report appears to be due to an unknown infection.

It is possible that perivasculitis retinae is not the expression of a single disease, but rather a notable clinical phenomenon common to several diseases, of different aetiology and distinguished from each other clinically by such features as differences of age incidence, localisation of the changes in the veins alone or in both arteries and veins, the more or less peripheral situation of the early lesions, the rapidity of the pathological process, the occurrence of vitreous haemorrhage, and the presence of disturbances of the central nervous system.

This case was first seen by Mr. Inglis Pollock, to whom we are indebted for permission to publish the above report.

REFERENCES

1. Goldstein, I., and Wexler, D.—*Arch. f. Ophthal.*, Vol. CIII, p. 552, 1930.
2. Axenfeld, Th., and Stock, W.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XLIX (i). p. 28, 1911.
3. Davis, A. E.—*Trans. Amer. Ophthal. Soc.*, Vol. XVIII, p. 59, 1920.
4. Alexjewa, W. L.—*Sammelschrift f. Augenheilk.*, Moskow, p. LXVI, 1921.
5. Suganuma, V.—*Arch. f. Ophthal.*, Vol. CXVIII, p. 443, 1927.
6. Marchesani, O.—*Bericht über Heidelberg Ophthal. Ges.*, p. 53, 1934.
7. Fleischer, B.—*Iber. Ophthal.*, p. 560, 1914.
8. Axenfeld, Th.—*Ber. ü. deutsch Opthalm. Ges.*, Vol. XLII, p. 298, 1920.
9. Eppenstein, A.—*Arch. f. Ophthal.*, Vol. CIII, p. 195, 1920.
10. Birnbaum, Prinzmetal and Connor.—*Arch. Int. Med.*, Vol LIII. p. 410, 1934.
11. Marchesani, O.—*Arch. f. Augenheilk.*, Vol. CIX, p. 124, 1935.
12. Gilbert, T. W.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XCIV, p. 335, 1935.
13. E. von Hippel.—*Arch. f. Ophthal.*, Vol. CXXXIV, p. 121, 1935.
14. Bürger.—*Med. rec.*, Vol. XCVII, p. 431, (March 13, 1920).
15. Letulle.—*Presse Med.*, Vol. XXXVI, p. 193, (February 15, 1928).
16. Sigler.—*Am. Clin. Med.*, Vol. III, p. 475, (January, 1925).
17. Mayerhofer, H.—*Wien. Klin. Wochenschr.*, Vol. XL, p. 1199, 1927.
18. Lluesma, P.—*Med. ibera*, p. 537, 1929.
19. Kokott, W.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XCIV, p. 327, 1935.
20. Cords.—*Zeitschr. f. Augenheilk.*, Vol. XXVI, p. 441, 1911.
21. Igersheimer, J.—*Arch. f. Ophthal.*, Vol. LXXXII (ii), p. 215, 1912.
22. Nicolate.—*Boll. d'ocul.*, VI, Nr. 10, p. 735, 1927.
23. Natale, A.—*Rev. Assoc. med. Argent.*, Vol. XLVI, p. 1055, 1932.
24. Gilbert, W.—*Münch. Med. Wochenschr.*, Vol. LXI, No. 6, p. 306, 1914.
25. Löwenstein, A.—*Med. Klin.*, p. 879, 1931.
26. Santowsky, P.—*Arch. oftal. Buenos Ayres*, Vol. VIII, p. 44, 1933.
27. Anthonisen, H.—*Acta Ophthal.*, Vol. XIII, p. 289, 1935.
28. Knapp, Paul.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XCIV, p. 748, 1935.
29. Eccheverria, M.—*Zeitschr. f. Augenheilk.*, Vol. XLVIII, p. 203, 1922.
30. Ballantyne, A. J.—*Ophthalmoscope*, Vol. VII, p 662, 1909.
31. Marchesani, O., and Stauzi, R. H.—*Arch. f. Augenheilk.*, Vol. CIX, p. 281, 1935.
32. Axenfeld, Th.—*Klin. Monatsbl. f. Augenheilk*, Vol. LXXXV, p. 478, 1930.

KATHOLYSIS IN THE TREATMENT OF RETINAL DETACHMENT. A PRELIMINARY NOTE

BY

H. B. STALLARD

LONDON

ELECTROLYSIS was tried in the surgical treatment of retinal detachment towards the end of the 19th century by Montgomery, Snell, Terson, Motais, Abadie, Schoellers, Albrand and others, and it has recently been revived by Imre and Vogt and others who have termed it katholysis. The main difference between this therapeutic procedure in those days and now is the importance of the accurate localization of retinal tears with the object of closing

them through a circumvallation of choroido-retinal adhesions induced aseptically by chemical caustics or through the medium of such physical agents as heat and electricity.

The therapeutic principle of katholysis is to effect a caustic reaction through the liberation of sodium and hydroxyl ions at

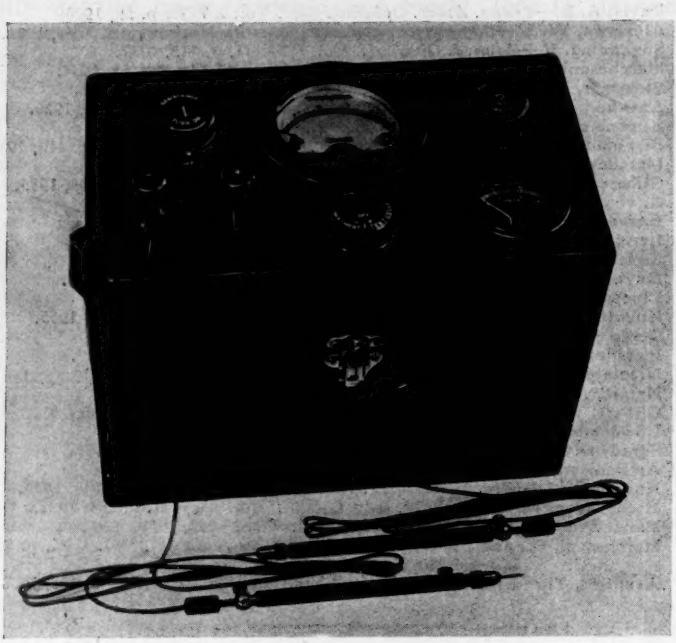


FIG. 1.

Hamblin's Ocular Ionizer.

the point of the negative terminal which is inserted through the sclera into the choroid.

The apparatus which I have used is called Hamblin's Ocular Ionizer and I am grateful to Mr. Smellie of Theodore Hamblin for the following notes about this instrument. (See fig. 1).

Hamblin's Ocular Ionizer employs a dry cell battery of considerable current capacity, with an electromotive force variable from 3 to 36 volts. The dry cell is eminently suitable for the purpose as it yields a current entirely free from oscillations or ripples unless it is allowed to run down to a very low state. In the latter event, some slow fluctuations of electromotive force occur.

The negative connecting wire from the battery is joined in series to two finely wound resistances of 5,000 ohms and 25,000 ohms, one of which acts as a coarse and the other as a fine adjustment. From the resistances the connection passes to the milliampèremeter and thence to the negative pole of the battery. The switch has two alternative pairs of contacts, one pair merely connecting the two poles of the battery to the voltmeter for the purpose of testing the electromotive force of the cells. The other pair of terminals closes the circuit between the external terminals when the appropriate connections have been made by way of the applicators to the patient's tissues.

Caution suggests that while these connections are being made, both resistances should be at their maximum and the current correspondingly at minimum, as indicated by the word " off." The windings are so fine that the current increase can be controlled by steps of less than one tenth of a milliampère up to the required amount.

The apparatus is contained in a convenient carrying case and is complete with the necessary flexes, negative and positive needle holders, and straight and bent needles of platinum alloy.

The positive terminal is a zinc rod 1 mm. in diameter held in a suitable holder which is attached by a rubber-coated cable to the appropriate battery terminal. As a convenient alternative to this, A. H. Briggs conceived the idea of attaching the positive wiring to an Arruga's retractor used during the operation to hold aside Tenon's capsule and the orbital tissues.

The negative terminal is a platinum-iridium needle coated with bakelite except at its extremities, one of which is blunt 0·75 mm. in diameter and is inserted into a slot in the holder, the other is fined down to a needle point of 1 to 2 or more millimetres in length as is required. Straight needles are used for the pre-equatorial part of the globe and for the post-equatorial region a right-angled bend some 4 mm. from its point facilitates the insertion of the needle. With this right-angled needle I have sometimes experienced a " give " in its shaft particularly when it has become slightly blunt and in operations in the macular area where the sclera is thicker than elsewhere. Probably a shorter shaft and a modified holder would prevent this " give." Needles of 1 mm. long are I think sufficient when operating near the equator in a myope, 1·5 mm. long for the ora serrata tears and 2 mm. long for the posterior 1/3 of the globe. In one case I had to pass the needle through the fibres of the inferior oblique muscle at its insertion and selected a 4 mm. needle for this purpose. It worked admirably.

The technique is as follows. The pupil is dilated by a mydriatic and local anaesthesia is produced by 4-6 drops of pantocain 1 per

cent. instilled at 5 minute intervals before operation. Pantocain does not dull the corneal epithelium as cocaine is apt to do. A clear cornea is essential for such ophthalmoscopic examinations as it is necessary to make during the operation.

Tenon's capsule is injected with 2 c.c. of 2 per cent. novocain and 2 drops of adrenalin 1/5000 are instilled into the conjunctival sac. Dark green sterile towels are used to isolate the eye instead of white towels which reflect light and thereby minimise its concentration if an ophthalmoscopic examination is made by the indirect method during the operation. The lid speculum is of a dull black finish to avoid annoying reflexes from its surface.

I prefer to operate in gloves and I have never found that this has impaired my sense of touch when trephining the eye at the end of operation. The conjunctiva is incised at the appropriate site and 2 or 3 sutures are inserted in the posterior edge of this incision and clamped by forceps to the sterile lint mask surrounding the eye, thus retracting the conjunctiva and rendering it easily accessible for suturing at the end of operation.

Tenon's capsule is then incised and the sclera cleanly exposed by passing the closed blades of a pair of blunt-ended scissors into the incision and opening them out between the sclera and deep surface of Tenon's capsule. A traction suture of No. 1 silk may be inserted through the superficial half of the sclera at an appropriate site where maximum exposure of the sclera is desired. If it is necessary to divide an extra-ocular muscle two mattress sutures are inserted into the muscle belly 3 mm. behind its insertion and the muscle is divided 2 mm. in front of the sutures. Care is taken to avoid any surgical traumatism in the vicinity of the vortex veins.

Arruga's retractor (see fig 2) is an excellent mechanical aid in the exposure of the sclera as far back as the dural sheath of the optic nerve. For rotating the globe forwards and to gain a better access to the posterior 1/3 of the sclera, Down Bros. made for me a curved double pronged hook with teeth 0·6 mm. long set obliquely at an angle of 60° with the vertical for insertion into the sclera. This instrument grips the sclera very well without penetrating it, steadies the globe, and its handle does not obstruct the field of operation. (See fig. 3). It is unnecessary to use a traction suture when this instrument is employed.

The surgeon may elect to use both electrodes himself entrusting the traction on the globe and the retraction of soft tissue surrounding it to his assistant or he may prefer to hold the traction suture with one hand and the negative electrode with the other, the assistant taking charge of the positive electrode. Briggs' modification of Arruga's retractor which is connected with the positive

terminal saves an additional instrument and frees one hand of either the surgeon or his assistant.

If this retractor is not used the positive electrode is placed on the sclera 3 mm. or so away from the needle of the negative electrode which is inserted through the sclera and into the choroid.

FIG. 2.

Arruga's Retractor.

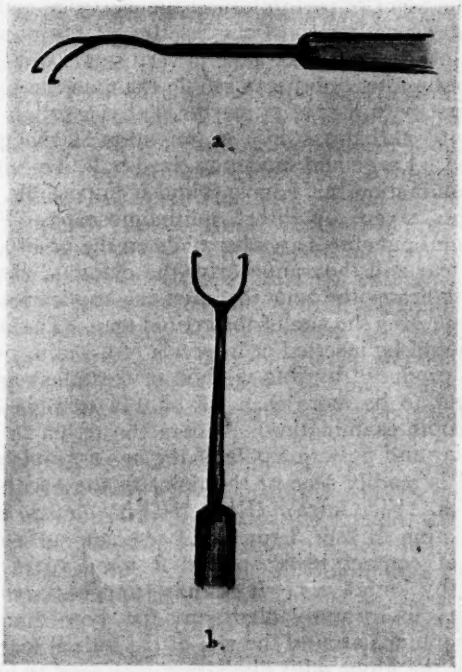


FIG. 3.

A double pronged retractor. The radii of curvature of the long axis and the transverse axis of the prongs coincides approximately with that of the sclera in these two planes respectively. The sharp teeth at the extremity of the prongs project backwards at an angle of 60° and are 0·6 mm. long.

By pressing a button on the handle of the negative electrode the current passes between the two electrodes. Bubbles of hydrogen gas are liberated at the tip of the needle in the choroid. I have used a current of 1·75 milliampères, and more recently 3 milliampères, for 4 secs., respectively. The milliampèremeter readings show that the current is maintained at a constant level throughout the operation. The lever of this instrument moves immediately into place as soon as the current is turned on and remains at this point until it is cut off.

The first puncture in the sclera is made as near as possible 2 mms. behind the site where the retinal tear is judged to be and the fundus is examined immediately after this. The opthalmoscope may be held wrapped in a sterile towel and a sterile rubber finger stall slipped over the index finger in order to operate the milled disc which rotates the lenses. Bubbles of hydrogen gas are seen at the point of perforation of the electrode and these serve for intra-ocular localization of the relation of the puncture to the retinal tear. As the puncture hole is very small and is sometimes difficult to locate after ophthalmoscopic examination it is advisable to mark it first with a spot of sterile methyl gentian violet. On the Continent ophthalmoscopic examination is made by the indirect method. Large and moderate sized holes are visible by this means of examination but I have found it impossible to see small holes or splits except by direct ophthalmoscopy. For marking purposes scleral punctures are also made on the nasal and temporal sides of the tear and then anteriorly, the diamond shaped area so demarcated indicates the zone for intensive application of katholysis around and over the site of the retinal tear. The needle (negative pole) should be inserted at intervals of 0·5 mm. over this area as the scars produced by this method of treatment are small and do not appear to be more than 0·5 or 0·75 mm. in diameter on ophthalmoscopic examination. Where the retina is shallow and at the macular and posterior pole of the eye a greyish-white fluffy edged cloud is readily seen at the point of the needle in addition to the bubbles. (Vide infra). (Recently I have made in some cases a circumvallation of 2 or 3 rows of Larsson's surface diathermy, the points of contact being placed 3 mm. apart, outside the area treated by katholysis. It is quite unnecessary and may be even mischievous to apply diathermy for more than 2 or at the most 3 rows (6mm.) around the site of the retinal tear. Extensive plastering of the globe with diathermy may lead to an increase of the inter-retinal fluid by exudation from the choroid and owing to widespread damage to this structure interfere with its power to absorb any small residue of inter-retinal fluid that may exist after operation).

The sclera is trephined over the site of the retinal tear except

when this is at the ora serrata or when the retina lies adjacent to the choroid and the inter-retinal fluid has accumulated elsewhere in which case the most dependent part of the eye over the site of the detachment is selected, having due regard to the position in which the head will be placed after operation.

In order to avoid damage to the choroidal vessels, which if cut by the trephine may retract beneath the sclera and cause an extensive intra-ocular haemorrhage, the trephine incision should stop after dividing all but a thin expanse of the deepest layers of scleral fibres. These fibres are then carefully picked up by a fine curved hook with a 1·5 mm. cutting edge on its concavity. A cruciform incision is made through the deepest layers of the sclera and through this opening the choroid herniates. There is seldom any choroidal bleeding when this technique is practised, but if it occurs it should be checked immediately by the application of a probe heated in a spirit flame. A choroidal haemorrhage results in a failure to establish union between the retina and the choroid around the tear.

The choroid is then split with a blunt punctum dilator and the inter-retinal fluid evacuated. Tenon's capsule is replaced over the sclera and the edges of the conjunctival wound brought together with a few interrupted sutures of fine silk. Atropine is instilled, sterile pads soaked in ol.parolein are applied to the eye and a many-tailed bandage (Foster Moore pattern) is applied firmly.

The head is placed so that as far as possible gravity will permit the vitreous to press the retina against the choroid at the site of the retinal tear and at the same time permit drainage through the trephine hole. There is no need to disturb the dressing for three days when the lid margins may be gently swabbed and some warmed atropine drops instilled into the lower fornix by gently drawing down the lower lid without the patient opening or moving his eyes.

The second dressing is done on the 6th day and then on alternate days until the 14th day when Lochbrille glasses with a central aperture of 3 mm. are substituted for the dressings.

I think it is undesirable to examine the fundus before the 8th day when a brief survey with reduced ophthalmoscope illumination may be made. To place the uveal tract at rest atropine drops are instilled at each dressing and I think should be continued for at least two months after operation and even three months when a Larsson surface diathermy operation has been done on account of the risk of late iritis in the latter operation.

For at least three months after operation the patient should take great care to avoid stooping, lifting heavy weights and straining. Jolts and knocks about the head and face are always dangerous in such cases.

Commentary

In favour of katholysis is the precision with which its effect on the ocular tissues is circumscribed. There is no extensive spread of the current and on this account no damage is inflicted on other intra-ocular structures remote from the area of operation. After katholysis I have not yet seen such complications as cyclitis, iritis, cataract and optic neuritis which follow in some cases in retinal detachment treated by any one of the surgical diathermy procedures.

Ophthalmoscopically the choroido-retinal scars appear to be 0·5 to 0·75 mm. in diameter, are well localized and do not appear to cause extensive fibrosis of the choroid, a feature which when widespread must damage the choroid and interfere with the absorption of the inter-retinal fluid. In most cases of retinal detachment treated by katholysis there are a few fine opacities in the vitreous over the site of the operated area for three or four weeks but elsewhere this structure is very little disturbed.

The minute and well localized areas where the caustic effect of katholysis has operated are particularly advantageous in the treatment of a retinal tear at or near the macula where it is essential to avoid widespread damage to the adjacent retina and the optic nerve.

Another advantage of katholysis is its value in localizing the site of the retinal tear. At the point of insertion of the negative electrode through the sclera and choroid a string of hydrogen bubbles about 2-3 mm. long is to be seen, easily recognizable on ophthalmoscope examination and these afford an important mark of the relationship of the puncture to the site of the retinal tear. In the katholysis operation when a retinal tear lies beneath the course of an extra-ocular muscle there is no need to divide it as a needle 4 mms. long may be used to pierce the muscle fibres and then the sclera and choroid. In one case under my care at Moorfields the inferior oblique muscle was pierced in this manner at its insertion. Division of an extra-ocular muscle is, in some instances, necessary for the purpose of surgical access to post-equatorial parts of the sclera but for the exposure of the sclera at and in front of the equator a muscle may be gently retracted by means of a double loop of No. 1 silk passed round its belly.

So far I have never seen intense reaction after katholysis with choroidal hyperaemia and conjunctival chemosis as sometimes occurs after diathermy and renders the prognosis of some cases bad.

Also there are no dense adhesions formed between the sclera and Tenon's capsule, a feature which makes exposure of the sclera a relatively easy matter if a second operation should prove to be

necessary. After surface diathermy the sclera and Tenon's capsule are so densely matted together that clear exposure and haemostasis are only effected after considerable trouble.

Some recent research work by Weekers on the surgical treatment of retinal detachment has shown the importance of the part played by plugs of organized granulation tissue which, passing through puncture wounds in the ocular tunics, adhere firmly to the episcleral tissues outside and to the vitreous within but not to the choroid and sclera on their way through these structures. The function of these granulation tissue plugs is to act as links between the outer surface of the vitreous and the episcleral tissues holding the retina pinned back in juxtaposition with the choroid.

Up to date insufficient histological examinations have been made after katholysis to ascertain whether this feature has any bearing on the success or failure of the katholysis operation when the negative needle has been deliberately passed into or just through the retina during operation.

Other lesser advantages are concerned with the apparatus which is simple in structure, reliable, sensitive, portable and inexpensive. Among the disadvantages may be mentioned the lowered intra-ocular pressure after several punctures have been made with the kathode needle and some inter-retinal fluid has been lost. However, this does not make trephining at the end of operation insuperably difficult for with patience and care it may be effected without any untoward accident. I think trephining is the most satisfactory method of draining the inter-retinal fluid. A trephine hole takes longer to close than the punctures with micro-pins and other such devices. Multiple fine punctures may all close simultaneously in a relatively short time whereas drainage from a trephine hole carefully placed and fashioned will be effective at least for several days after operation and in some cases for several weeks.

The tenacity of the choroido-retinal scar after katholysis is problematical. Up to date I have had the impression that the scars are too small and feeble to seal effectively a large retinal tear and some moderate sized holes in the upper half of the retina in the majority of such cases.

Results

As yet I have treated by katholysis alone too few cases to give any fair statistics of the results of treatment. My impression is that katholysis is of value in anterior dialysis in the lower half of the retina. The operative reaction is well localized and does not spread to the ciliary body and with the help of the vitreous and gravity the choroido-retinal adhesions seem to be firm enough to hold the retina *in situ*. Of three cases of oral tears in the lower

half of the globe two have been operative successes and one, after an immediate success, recurred.

In two cases of moderate myopia the lower half of the retina was detached but no retinal hole was found. Katholysis was employed in an attempt to pin down the retina immediately behind the ora serrata and just in front of, and behind the equator by two lines of punctures in these respective planes passing between the lower borders of the internal and external recti muscles. In both cases there was immediate success but one recurred one month and the other two months after operation.

In the upper half of the globe the sealing of extensive rents and large horseshoe-shaped tears has not been effective. In a few cases the retina remained *in situ* during the patient's stay in hospital but recurred within a few days of discharge. Others were a failure from the outset. With the present technique I feel that katholysis alone is insufficient to effect firm and reliable union between the choroid and retina around large tears situated in the upper half of the globe and should be augmented by surgical diathermy.

Recently it has been my practice in such cases to make a number of punctures with the kathode over the site of the hole and to circumvallate its edges with two or three rows of punctures set 0·5 mms. apart and outside this to apply two or three rings of Larsson's surface diathermy the points of contact on the sclera being placed 2 mms. apart. (In three cases of large upper temporal horseshoe rents and two cases of multiple round holes treated by this modification the result has been successful up to date).

Conclusion and Summary

Katholysis in the surgical treatment of retinal detachment is of value for the purpose of localizing the site of a retinal hole in relation to the external surface of the sclera at the time of operation. The cauterization produced leads to fine choroido-retinal scars which in my opinion may be adequate for sealing small holes and for tears in the lower half of the retina but have insufficient tenacity for moderate and large holes in the upper half of the retina.

Up to date none of the serious immediate and late post-operative complications which are seen in some cases treated by surgical diathermy has been noted after katholysis.

REFERENCES

Arruga, H.—Detachment of the Retina. Barcelona, 1936.
Imre.—*Zeitschr. f. Augenheilk.*, Vol. LXXXIV, p. 302, 1934.
——— *Ibid.*, Vol. LXXXV, p. 336, 1935.
Cole Marshall, J.—Detachment of the Retina. London, 1936.
Montgomery, W. T.—*Jl. Amer. Med. Assoc.*, Vol. XXVII, p. 702, 1896.
Snell, S.—*Trans. Ophthal. Soc. U.K.*, Vol. XVI, p. 72, 1895-6.
Vogt.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XCVI, p. 15, 1936; *Brit. Jl. of Ophthal.*, Vol. XVIII, p. 650, 1934.
von Szily and Machemer.—*Klin. Monatsbl. f. Augenheilk.*, Vol. XCVI, p. 36, 1936.
——— *Ibid.*, Vol. XCVI, p. 191, 1936.
Weekers, L.—*Arch. d'Ophtal.*, Vol. LII, p. 636, 1935.

ANNOTATION

1916—1937

The Editorial Committee think that our readers will be interested to be reminded that with this number the *British Journal of Ophthalmology* celebrates its 21st birthday, a matter for congratulation, retrospection and anticipation. As is well known to the older members of the ophthalmological fraternity, we took our rise in 1916 by the formation of a limited company which took over the three journals existing at that date. These comprised, in order of seniority, *The Royal London Ophthalmic Hospital Reports, The Ophthalmic Review* and *The Ophthalmoscope.* Together, they form a splendid heritage for the Journal. Much of the spade work in founding our Journal was done by the late Mr. Walter Jessop, and our first number appeared on January 1, 1917.

The object of the new venture was to further the progress of ophthalmology; and that this object has hitherto been attained is evidenced not only by the monthly numbers, but also by the three books and seven monograph supplements which have been issued. The financial details of the foundation of the *British Journal of Ophthalmology, Ltd.,* were firmly established by Messrs. J. B. Lawford and Leslie Paton, and the financial management was continued under the auspices of Messrs. Ernest Clarke and Harold Levy. The control of the subject matter has been under the care of the Editorial Committee, under the Chairmanship first of Mr. Lawford and subsequently of Sir John Parsons. The chief burden of responsibility has, however, fallen upon the editors, and the committee wish to express their high appreciation of their work. Mr. Sydney Stephenson and Mr. Erskine Henderson carried out their duty admirably for seven years and on the death of the former Mr. R. R. James joined Mr. Erskine Henderson as an editor. On the death of the latter in 1929, Mr. R. R. James became senior editor. All those responsible for the control of the Journal and all its readers owe a very great debt to Mr. James for his unremitting zeal and for his enthusiasm in reaching and maintaining a high standard in the conduct of the Journal. He has of recent years been ably assisted by Messrs. Williamson-Noble and H. B. Stallard.

The production of such a journal involves much laborious routine work in the correcting of proofs, and so on. The editors have been generously aided in these respects during nineteen years by Dr. Ernest Thomson of Stirling, to whom the committee take this opportunity of tendering their thanks, nor should the devoted

labours of the manager, Mrs. Kelf, over the whole period of existence of the Journal, be overlooked. Lastly, the printing and publication have been in the hands of Messrs. George Pulman and Sons, to whom the management are indebted for the meticulous efficiency and punctuality with which they have carried out the work.

So much for the past. What of the future? We feel that the prospects are good; and we end by expressing the hope that when *The British Journal of Ophthalmology* celebrates its Jubilee it may be as healthy, both scientifically and financially, as it is at present.

ABSTRACTS

I.—MEDICAL OPHTHALMOLOGY

(1) **Cox, Ronald A. (Washington).—Congenital head-nodding and nystagmus.** *Arch. of Ophthal.*, June, 1936.

(1) **Cox's** paper opens with a table giving the differential diagnosis between the congenital and acquired varieties of this condition, the latter being known as spasmus nutans. The main points are that the congenital condition is present at birth, persists throughout life, is binocular and has head movements which appear to compensate for the eye movements. Spasmus nutans, on the other hand, develops after birth usually between the fourth and twelfth months, and disappears about the third year, it may be monocular and the head movements have no relation with those of the eye. The author's case was congenital and beyond lateral movements of the head and eyes and some hypermetropia showed nothing abnormal. There was no consanguinity in the parents but there was a definite family history of the condition, 7 out of 30 known members of the family having the head and eye movements. The distribution of these is shown in a chart which accompanies the article.

F. A. W-N.

(2) **Abeles, Milton M. (New York).—Medullated optic nerve fibres accompanying oxycephaly and other cranial deformities.** *Arch. of Ophthal.*, August, 1936.

(2) **Abeles** has noticed the presence of medullated nerve fibres of the retina in 9 out of 15 cases of oxycephaly, whereas the incidence of this condition in the general population has been stated to

be from 0·3 to 0·24 per cent. Medullated retinal nerve fibres were also found in four cases of marked macrocephaly, 2 of marked brachycephaly, 2 of marked dolichocephaly and one of trigonocephaly. The correllation between cranial deformities and the presence of medullated nerve fibres is capable of various explanations.—1. It may be a parallel mark of the maldevelopment which has produced the cranial defects. 2. It may be due to weakness of the lamina cribrosa since the absence of this structure in the rabbit's eye is said to be the cause of the myelinisation of its retinal nerve fibres. Weakness of the lamina could be produced in two ways (*a*) by stretching due to papilloedema (*b*) by restriction of the normal movements of the eyes owing to the shallowness of the orbits. If the oxycephaly is so marked as to produce optic atrophy, the medullation of the retinal nerve fibres disappears.

F. A. W-N.

(3) **Duncan, L. (Melbourne).—Binasal hemianopia.** *The Med. Jl. of Australia*, August 8. 1936.

(3) After pointing out the rarity of visual fields which show defects of such a kind as to merit the term binasal hemianopia, **Duncan** reviews the reported cases and discusses their aetiology.

He points out that most frequently such visual fields are seen in cases of papilloedema associated with increased intra-cranial pressure—the suggestion being that internal hydrocephalus with a distended third ventricle allows pressure to bear upon the optic tracts or nerves adjacent to the chiasma. Other cases are seen in optic atrophy from various causes, in syphilitic meningitis and rarely from arterio-sclerosis showing thickened carotid arteries to indent the outer chiasmal fibres. He adds three cases to those already reported, two associated with optic atrophy following papilloedema accompanying increased intra-cranial pressure and one associated with syphilitic optic atrophy. The visual fields showing the stages in the development of the binasal hemianopia are reproduced.

R. C. DAVENPORT.

(4) **Velter, E. (Paris).—The diagnosis of affections of the chiasma and sellar regions. (Le diagnostic des affections de la region chiasmatique et sellaire).** *Arch. d'Ophtal.*, Vol. LIII, August, 1936.

(4) **Velter** describes the clinical features of the chiasmal syndrome and discusses their diagnostic and pathological significance.

In his paper he has divided the subject into two main groups: (1) Tumours and cysts; (2) Lesions, other than tumours, such as

trauma, inflammation, aneurysms and other diseases. The neoplasms are classified according to their anatomical situation (*a*) Intra-sellar. Adenomata of the pituitary gland—chromophobe, acidophil, basophil; (*b*) Craniopharyngioma; (*c*) Retro-sellar, sub-sellar and supra-sellar neoplasms including epithelioma of the sphenoid and chordoma, an embryonic neoplasm arising from the spheno-occipital synostosis; (*d*) Third ventricle neoplasms; (*e*) Cholesteatomata; (*f*) Chiasmal glioma.

The author endeavours to bring out clinical points in the differential diagnosis of these neoplasms. The behaviour of the visual field defects, the presence and course of papilloedema and optic atrophy are of particular interest to the ophthalmologist. Papilloedema is exceptional in acidophil adenomata, it is sometimes well marked in craniopharyngioma and has been noted in epithelioma of the sphenoid and chordoma of the spheno-occipital synostosis. It is a later complication in third ventricle neoplasms. Optic atrophy occurs very late in basophil adenomata of the pituitary, it is rapid and sometimes unilateral in craniopharyngioma and well marked in third ventricle neoplasms. Bitemporal hemianopia is inconstant in basophil adenomata; may be atypical in retro-sellar and sub-sellar neoplasms; and in third ventricle neoplasms it may affect the inferior part of the visual field on both sides.

The results of radiography, ventriculography and lumbar puncture afford considerable help in some cases in arriving at a pathological diagnosis. General medical signs of a particular character are evident in association with the adenomata of the pituitary gland and differentiate them from each other and are also evident in neoplasms involving the floor of the third ventricle when polydypsia, polyuria, cardiovascular and respiratory disorders become manifest.

The significance of local disturbances affecting the sensory divisions of the fifth nerves to extra-ocular muscles, and the cavernous sinus is discussed.

Adenomata of the pituitary are radiosensitive but the other neoplasms require surgical attention when this is feasible.

In the second group of lesions the author describes traumatic lesions, sphenoidal sinusitis producing superior hemianopia, syphilitic meningitis and arachnoiditis affecting the chiasma and optic nerves. The results of operations on cases of arachnoiditis in the sellar region are interestingly described. Some good seems to have come from stripping the felt-like adhesions from the affected chiasma and optic nerves.

The paper is illustrated by skiagrams and case reports demonstrating the clinical features of various lesions.

H. B. STALLARD.

(5) **Bertsch, M. (Strasbourg).—The reticulo-endothelial system of the eye and disorders of fat metabolism. (Le système réticulo-endothélial de l'oeil et les troubles du métabolisme des graisses).** *Arch. d'Ophtal.*, Vol. LII, p. 663, 1935.

(5) **Bertsch** has collected in this paper certain ocular and general medical disorders in which there is a disturbance of fat metabolism characterized by lipoid infiltration of reticulo-endothelial cells. Xanthelasma, arcus senilis, Gaucher's disease, Niemann-Pick's disease and the Christian-Schüller disease are described.

Gaucher's disease is familial, shows a preference for females, has an insidious onset and a chronic course lasting several years and terminating in cachexia and death. The spleen, liver, lymph nodes, visceral ganglia and bone marrow are enlarged and infiltrated by large round or polygonal-shaped cells which contain a small eccentric nucleus which shows variations in form and amount of chromatin. Dèbris of blood and haematogenous pigment is also present.

The author quotes Redslob and Gèry who, at an autopsy on a case of Gaucher's disease, found typical cells in the choroid among the chromatophores and stroma cells. These cells, characteristic of Gaucher's disease, were smaller in size than elsewhere in the body and had a small feebly staining nucleus, the protoplasm being homogeneous in some and fibrillary and containing vacuoles in others. There is a denser infiltration of cells near the papilla.

Mandlebaum is quoted as having found yellowish-brown cuneiform areas in the conjunctiva with the base towards the limbus, appearing at first on the nasal side and then on the temporal side at the sites where pingueculae occur.

In infants suffering from Gaucher's disease the eyes lose their expression, an intermittent bilateral convergent squint develops, both eyes being deviated up and in in some cases. The infant fails to follow a light, ophthalmoscopic examination reveals a normal fundus.

Niemann-Pick's disease is also a familial disorder affecting Jewish infants within the first two months of life. It is characterized by enlargement of the liver and spleen, brown pigmentation of uncovered parts of the skin, psychic decadence, immobility, apathy, progressive cachexia and death. Vision is conserved to the end in the pure form of this disease but it is sometimes associated with amaurotic family idiocy, the author quotes from the literature 7 out of 27 cases in which this occurred.

Christian-Schüller disease is characterized by areas of softening in the bones of the vault of the skull, destruction of the anterior part of the sella turcica, polydypsia and polyuria from hypophyseal involvement and exophthalmos from an orbital deposit of

large polygonal-shaped cells the cytoplasm of which contains vacuoles of material that take fatty stains.

Deposits of fatty material have also been noted in the sclera and retina and papilloedema is described as a complication following an intracranial deposit.

The paper contains some interesting clinical and pathological facts about these diseases.

H. B. STALLARD.

(6) **Toulant and Sarrouy (Algeria).—Ocular manifestations of bacillary dysentery.** *Arch. d'Ophtal.*, Vol. LIII, p. 523, 1936.

(6) **Toulant and Sarrouy** discuss the complexities of the bacteriological aspects of bacillary dysentery. Of the ocular manifestations sclero-conjunctivitis coincides with the appearance of arthritis and in some cases urethritis. Cosse and Delord are quoted as having observed this complication in 12 cases out of 420 and Nolf and his collaborators in the Belgian Army in 20 out of 1,200 cases. Sclero-conjunctivitis comes on slowly about the 10th to the 20th day of the illness when in certain less severe cases the intestinal symptoms have disappeared. Sometimes it precedes arthritis but more often it follows it. In addition to the generalised conjunctival hyperaemia there is some circumcorneal injection having a violet tinge and secretion from the conjunctival sac is sparse. The cure of this complication is rapid in 8-10 days.

Iritis is rare, it appears more slowly than sclero-conjunctivitis and comes on about the 20th-40th day. The reaction, pain and photophobia are very moderate, cure is often rapid but recurrences have been noted. Cyclitis, parenchymatous keratitis, and Descemetitis are other complications. The synechiae are readily broken down by atropinization and secondary glaucoma does not complicate this picture.

The authors report the details of a case of a woman aged 44 years who developed dysentery and on the 9th day had conjunctivitis in both eyes, with little discharge which cleared up after 3 days with instillations of argyrol drops.

On the 17th day of her illness rheumatic pains were experienced in the metacarpophalangeal joints of the right hand and 6 days later in the tarsus, the left shoulder and right sterno-clavicular articulation, these joints becoming swollen, red and painful.

On the 23rd day a plastic iritis occurred in the left eye, responded well to atropine and was cured in 13 days. On the 39th day a Descemetitis occurred in the left eye coinciding with an exacerbation of inflammation in the right shoulder joint and 3 or 4 fine vessels appeared in the deeper layers of the cornea. On the 76th day of the disease, and 53 days after the onset of iridocyclitis, all signs of irritation had disappeared but a small opacity remained in the cornea.

Ocular complications described by other authors are corneal ulceration, serpiginous ulcer of the cornea, paralysis of an external rectus muscle cured in 3 weeks, polyneuritis, choroidal haemorrhages and dacryoadenitis.

In discussing the pathogenesis the authors consider three hypotheses. That the ocular manifestations are due to (1) the dysentery bacillus (2) its toxin (3) some associated micro-organism such as the bacillus coli or pyogenic bacilli like the streptococcus and staphylococcus which gain entrance to the blood stream through the intestinal ulcers.

Conjunctival cultures and the aspiration fluid from affected joint cavities fail to reveal any bacillus responsible for dysentery. Bacteriological examinations of the intra-ocular tissues have revealed streptococci and staphylococci in a few cases but no dysentery bacilli. Bacillary septicaemia is rare in dysentery, Dudgeon having found a Flexner type of bacillus in 2 cases only.

The intra-venous injections of filtered cultures of B. Shiga into animals have produced iritis, arthritis and caecal lesions and thus afford some evidence in favour of toxins as the cause of the above lesions. Although specific agglutinins have been found in the fluid aspirated from joints they have not in the experience of the authors been detected in the aqueous fluid or tears.

The possibility of secondary infection by the bacillus coli, streptococcus and staphylococcus is discussed.

In concluding the authors suggest that the conjunctivitis which is benign and fleeting is a toxic lesion and that the iridocyclitis is microbic in origin.

H. B. STALLARD.

(7) **Frost, A. D. (Columbus, Ohio).—Papilloedema with special reference to papilloedema associated with sinus disease.** *Trans. Amer. Ophthal. Soc.*, Vol. XXXIII, p. 480, 1935.

(7) **Frost** reviews the aetiology of papilloedema and discusses some points of anatomical importance in relation to it. He describes 2 cases in young men aged 24 and 25 years, respectively, who were affected with papilloedema associated with posterior sinusitis. Premonitory symptoms were transient attacks of blurred vision and later pain in and behind the eye increased by using the eyes for near work. Papilloedema was of sudden onset in these cases and vision became seriously disturbed. The blind spot was enlarged and a caeco-central scotoma or sector defect appeared. A peripapillary retinal detachment is also mentioned among the pathological changes. In discussing the mechanism by which papilloedema is produced in these cases he is disposed to regard lymph stasis in the central part of the optic nerve as being the most probable explanation of the changes. This lymph

stasis is effected by oedema at the apex of the orbit compressing the optic nerve. Papilloedema disappeared, visual acuity and visual field changes recovered on drainage or aeration of the affected sinuses.

H. B. STALLARD.

(8) **Baratta (Parma).—The visual field, intra-ocular pressure and pressure in the retinal arteries in pregnancy and the puerperium. (Campo visivo, pressione arteriosa retinica, pressione endoculare in gravidanza e puerperio).** *Boll. d'Ocul.*, May, 1936.

(8) **Baratta** examined 30 pregnant women in the late stages; he found in four a diminished field on the temporal side. In one only this persisted after delivery. In almost all, the retinal arterial pressure was higher before delivery. The intra-ocular pressure was normal. He thinks the modifications of the field to be due to retinal exhaustion.

HAROLD GRIMSDALE.

II.—MISCELLANEOUS

(1) **Hippert, F.—Two cases of intermittent exophthalmos. Orbital varicocele. (Deux cas d'exophtalmie intermittente. Le varicocèle d'orbite).** *Arch. d'Ophtal.*, Vol. LIII, p. 135, 1936.

(1) **Hippert** describes the clinical features of two cases of intermittent exophthalmos. Both were males, in one the onset was noted at the age of 36 years and the other at 11 years of age and the left orbit was affected in both these cases.

Exophthalmos was induced by inclining the head forward and towards the affected side, a tight collar, lifting a heavy weight, straining, holding the breath and forcible expiration, and in one case, singing brought on an attack. Exophthalmos disappeared when the head was raised to the vertical position. During the exophthalmos the retinal veins were engorged and vision affected but between attacks the visual acuity returned to normal.

Enophthalmos was evident on the affected side, and was probably due to atrophy of the orbital fat.

The author discusses the clinical features, differential diagnosis, pathology, prognosis, complications and treatment of this disorder.

He quotes some interesting physiological facts made by Birsch-Hirschfeld on postural exophthalmos. Inclining the head forward produces an exophthalmos of 0·7 mm. which increases to 1·7 mm.:

after two minutes compression of the anterior facial vein exophthalmos increases to 3 mm. In the author's second case this vein was compressed and the exophthalmos increased. Compression ot the neck causes 1·5 mm. of exophthalmos which increases to 2·7 mm. when the head is inclined forward.

In discussing the pathology of intermittent exophthalmos the author suggests that narrowing of the entrance of the superior ophthalmic vein into the cavernous sinus, narrowing of the angular vein, the facial vein and the junction of the common facial and jugular veins plays a mechanical part in venous stasis at the apex of the orbit.

Radiographs of some cases have shown narrowing of the sphenoidal fissure and in the author's two cases this was associated with irregularity of the lumen of the fissure and the presence of a bony mass projecting into the upper and outer angle.

Phleboliths have also been noted. In a few cases pulsation of the ophthalmic artery has been transmitted to the varicocele. A generalised varicose state affecting the pampiniform plexus, veins in mucus membranes and haemorrhoids is evident.

Complications in the nature of orbital and cerebral haemorrhages and optic atrophy are rare. The differential diagnosis between orbital varicocele, orbital haemorrhage, vascular orbital neoplasm and pulsatile exophthalmos is discussed.

Some surgeons have apparently treated this condition by ligaturing the superior ophthalmic veins and dissecting out the varicocele, and others by the injection of sclerosing solutions such as quinine urethane into the dilated veins.

H. B. STALLARD.

(2) **Sobański, J. (Warsaw).—The vascular circulation in the retina under physiological conditions. (Der Blutkreislauf in der Netzhaut unter physiologischen Bedingungen).** *Arch. f. Ophthal.*, Vol. CXXXV, p. 372.

(2) In this study Sobański made observations on 80 normal persons, whose ages ranged from 7 to 75 years, with Bailliart's dynamometer and Fick's tonometer.

It was found that the pressure in the retinal vein varied with the age of the persons. In the three age groups (7 to 15, 15 to 40, and over 40) this pressure rose progressively, being on an average in the first group, minimal, lower than the intra-ocular pressure 16-22 mm. Hg, and maximal, 28 mm. Hg, and in the third 23 and 36 mm. Hg., respectively.

The pressure in the retinal artery in the first age group averaged 68/40 mm. Hg, and above the age of 15, minimal, 56-48 mm. Hg, maximal, 90-80 mm. Hg.

The ratio of the minimal venous pressure to the minimal arterial varies between 1 : 1·9 and 1 : 3. The ratio of the pressure in the retinal artery to the general blood pressure (taken in the brachial artery is, minimal, between 1 : 1·4 and 1 : 1·5, and, maximal, 1 : 1·3 and 1 : 1·6.

The pressure in the retinal capillaries must under physiological conditions on an average be 55/33 mm. Hg, varying according to the age of the individual between 28-39 mm. Hg (diastolic pressure and 48-63 (systolic).

THOS. SNOWBALL.

(3) **Sobański, J. (Warsaw).—The intra-ocular pressure and its influence on the vascular circulation in the retina. (Der Augendruck und sein Einfluss auf den Blutkreislauf in der Netzhaut).** *Arch. f. Ophthal.*, Vol. CXXXV, p. 383.

(3) Sobański here discusses two groups of cases, (*a*) one in which there is increased intra-ocular pressure without the signs of glaucoma and (*b*) cases in which the tension never rises above the limit of normal variation (22-24 mm. Hg), but glaucomatous changes (field defects, optic atrophy with increase in the cupping of the optic disc and loss of vision) develop.

In the first group the simultaneously raised pressure in the central retinal artery is the factor that protects the optic nerve and retina from the effects of the increased tension; even a tension of 35-40 mm. Hg produces no optic atrophy or excavation of the disc if the diastolic pressure in the retinal artery is sufficiently high (over 70 mm. Hg).

In the second group, to which the names " Glaucoma without increased tension " and " Pseudoglaucoma " have been given, there is always a subnormal general and local blood pressure, with injurious effects from the normal tension on the retinal circulation and the nutrition of the retina.

Simple optic atrophy and the glaucomatous changes in the field, it is stated, arise from disturbances in the retinal circulation, which occur not only with an increased intra-ocular tension (as in all varieties of true glaucoma) but also with a fall in the diastolic pressure in the retinal artery (pseudoglaucoma) through which the normal relation between it and the tension is altered.

The fundamental difference between pseudo- and true glaucoma lies in the excavation round the edge of the optic disc which is found in the latter. Where such excavation occurs even with normal tension in the course of simple optic atrophy, it is absolute proof of a previous rise of tension in the eye.

In every case of pseudo- and real glaucoma the retinal circulation as well as the tension should be examined, and in treatment

the tension reduced to a level corresponding to the diastolic pressure in the retinal artery.

In the treatment of cases of general arterial hypertension complicated with glaucoma the intra-ocular pressure must be reduced first.

THOS. SNOWBALL.

(4) **Sobański, J. (Warsaw).—The aetiology and treatment of tabetic optic atrophy. (Das Wesen der tabischen Sehnervenatrophie und ihre Behandlung).** *Arch. f. Ophthal.*, Vol. CXXXV, p. 401.

(4) In his study of the aetiology of optic atrophy in pseudoglaucoma **Sobański** noted a definite resemblance in the clinical symptoms between it and the optic atrophy of tabes dorsalis from the point of view of the disturbances in the circulation common to both.

In the majority of tabetics there is a fall in the general and local (central artery of the retina) blood pressure, especially in the diastolic pressure, and this is the rule in cases of tabes with progressive optic atrophy.

Three tables are given (*a*) of cases of tabes without optic atrophy (in which the pressure in the central retinal artery, tension, vision and fields are normal): (*b*) cases of early tabes with low blood pressure and constantly low tension—less than 14 mm. Hg—where the visual fields and optic discs are normal): (*c*) 33 cases of tabes with optic atrophy (with mostly low blood pressure and the tension so high as to interfere with the proper nutrition of the retina, thereby producing a simple optic atrophy analogous to that in pseudoglaucoma).

These tables show that there is a close connection between the onset of optic atrophy and the state of the circulation and particularly the height of the diastolic pressure.

The method of treatment evolved from these considerations was (1) to reduce the intra-ocular pressure by miotics (and in most of the 33 cases operation, usually cyclodialysis); (2) to raise the general and local blood pressure by the use of tonics and cardiac stimulants; (3) to carry out specific treatment, but only after the circulation in the retina is improved.

The bad results on the vision so often previously obtained by exclusively antiluetic treatment are then not to be feared, but specific treatment may be continued only under the strictest control of the circulatory system and the tension, as the normal relation obtained by treatment between these two may suddenly become altered.

As the vision and circulation improve the tonics are discarded and the pilocarpine is gradually reduced, but continued for a long

time, even in the intervals between the courses of specific treatment.

The use of pilocarpine and tonics is also recommended as a prophylactic measure in all cases, in which the above mentioned changes in the retina are observed or suspected, during the whole course of the antiluetic treatment.

The author is convinced that this mode of treatment of tabetic optic atrophy was never harmful but in most cases attended by improvement, and he urges that it be put to a practical test.

THOS. SNOWBALL.

(5) **Duggan, Walter F. (New York).—Use of vaso-dilators in treatment of retrobulbar neuritis.** *Arch. of Ophthal.*, September, 1936.

(5) **Duggan's** article is of interest not only from the therapeutic but also from the pathological standpoint. The vaso-dilator he employed was sodium nitrite given by intravenous injection in 10 per cent. solution the dose being 100 mg. The injections were administered daily for a period varying from 5-7 days. In 8 out of 9 acute cases reported, marked benefit resulted from the treatment. In cases of long standing, improvement was also noted, but more injections were usually needed. The pathological basis of treatment by vaso-dilators is the supposition that retrobulbar neuritis is caused by constriction of some of the vessels suppyling the optic nerve and the chiasma.

The rapid healing obtained in many cases of this disease is evidence against severe organic changes and points to a vascular nutritional disturbance of the optic nerve. The same cause is also indicated by the favourable results obtained after operation on the sinuses in which the surgical interference brings about a reflex engorgement of the optic nerves, and the improvement which results from administration of typhoid vaccine points the same way. Arguing from the good results obtained in tobacco amblyopia and retrobulbar neuritis by the use of vaso-dilators, the author puts forward the suggestion that the primary lesion in disseminated sclerosis is interference with the blood supply of the white matter of the central nervous system. Glial proliferation and myeloid degeneration are thus secondary changes due to the anoxaemia. The good results obtained by cervico-dorsal sympathectomy point to the same conclusion. The author recommends the intravenous injection of vaso-dilators in other types of amblyopia, *e.g.*, those due to poisoning by tobacco, thallium, lead, quinine and optochin.

F. A. W-N.

(6) **Horner, Warren D. (San Francisco).—Cataract following di-nitrophenol treatment for obesity.** *Arch. of Ophthal.*, September, 1936.

(6) The action of di-nitrophenol as an accelerator of metabolism has been known for many years. As long ago as 1885 di-nitro-napthol was found to have this action in dogs and a few years later similar observations were made with di-nitrophenol. In 1933, the drug was given to nine patients in doses of 3-5 mg. daily for prolonged periods. Weight was lost without the need for any dietetic restrictions and no undesirable symptoms were encountered. In spite of this, it was recommended that the drug should be used only under strictly controlled conditions. Since this time, di-nitrophenol in some form or other, has been used for reduction of weight by about 100,000 patients. The complications reported comprised the following:—cutaneous eruptions, congestive infection of the ear, jaundice, agranulocytic angina, peripheral neuritis, abortion, functional damage of the liver and heart muscles. Seven fatalities were also reported. In April, 1935, **Horner** saw a patient with bilateral incipient cataracts who had been taking di-nitrophenol for reduction of weight. Since then a total of about 50 cases have been reported. The earliest changes consist in bilateral dust-like opacities beneath the anterior capsule of the lens, and the development of a saucer-shaped granular opacity in the posterior layers of the lens, giving a " cloth of gold reflex " with the slit-lamp. The opacities rapidly invade the cortex and the nucleus, the whole lens becoming first greyish then pearl-like. As a result of these changes it swells and secondary glaucoma may ensue. In the early stages, the eye may develop 2-3 D. of hypermetropia. No cause has yet been found for the development of cataract in these patients. Immature lenses removed intra-capsularly and placed in a 2 per cent. solution of di-nitrophenol failed to develop any additional opacity, rats which are susceptible to cataract, failed to develop it when the drug was added to their diet, and the calcium content of the blood in patients with di-nitrophenol cataract was found to be normal.

The incidence of this complication is not high and lies probably between 0·1 and 1 per cent. Individual susceptibility varies widely. In 27 cases, the average length of time that passed after the drug was first taken until the cataract developed was 15 months. In 18 patients cataract developed after the drug had been discontinued for an average period of 7 months. It is remarkable that during the war, when many cases of di-nitrophenol poisoning occurred in French munition workers, no cataract was reported. Once the opacity has developed, anything short of surgical treatment has been found ineffective. The operation recommended by the author comprises an incision with the Graefe knife, one

half the usual size with a conjunctival flap; peripheral iridotomy, broad capsulotomy and expression by pressure and lavage of the anterior chamber. Should the anterior chamber be too shallow for the performance of a correct incision, retrobulbar injection of procaine hydrochloride and epinephrin will cause it to deepen. In the discussion following the author's paper Bedell mentioned that there were no fewer than 17 proprietary preparations containing di-nitrophenol; Frost that he had seen a case of partial optic atrophy due to the drug and Whedon that he had cured a case of incipient di-nitrophenol cataract by Gifford's hot water treatment every hour combined with instillation of 4 per cent. dionine three times daily.

F. A. W-N.

BOOK NOTICES

Saggi di Oftalmologia. Vol. VIII. Bologna. 1934-1936. Price not stated.

This large volume contains some 40 papers by various authors connected with the Clinic at Bologna. The papers are reprinted from various journals; some of them have been noted in abstracts in this journal as from time to time they have appeared; the papers are of different sizes and are placed so that the works of each author appear together; this does not make for easy consecutive reading.

The first, the longest and most important paper, " on tuberculosis as affecting the eye," is from the pen of Prof. Di Marzio, and is extracted from a work on extra-pulmonary tuberculosis. Other papers on tuberculosis are contributed by Caramazza. Biozzi has two papers on Fuchs' heterochromia and this he considers to be in many cases tuberculous in origin. It will be noted, therefore, that tuberculosis has a considerable part in these works. From the form of the volume, no index is possible apart from the table of contents at the beginning.

The whole shows that, at Bologna, the Clinic is alive; it may be highly congratulated on the record of work done.

Annual Report of the Ophthalmic Hospital of St. John of Jerusalem, 1935. Chancery of the Order, Clerkenwell, London.

Throughout the year approximately seventy new patients were examined and treated and ten operations were performed every working day. Of these about 77 per cent. were by religion Moslems, 11·6 per cent. were Christians and the rest were Jews.

The incidence of trachoma among the new cases was 92 per cent. It is known that in the more backward villages of Palestine practically all the inhabitants beyond the age of infancy have acquired trachoma; in the larger towns it is much less. There has been an increase of trachoma following in the wake of the cycle of severe epidemics of acute conjunctivitis.

Among the new cases 11·6 per cent. were blind in one eye, and 4·1 per cent, were blind in both eyes. Those blind in one or both eyes were 15·8 per cent. It is of interest to compare these statistics of blindness with those of the Egyptian Government Ophthalmic Hospitals where so high a percentage as 15·3 was found in 1919, but this had improved by 1934 to 6·2 per cent. But while in Egypt the ever-flowing Nile provides water all the year round, Palestine has to depend on a scanty rain-fall which is now only about half what it was in 1919. For many of us it is difficult to imagine a country where water is so scarce in some parts that it is almost necessary to measure it out with an eye dropper.

81 per cent. of the blindness is the result of acute conjunctivitis.

Annual Report of the Department of Health of Palestine, 1935. Printing Office, Jerusalem. Price, 130 mils.

In his comprehensive report, Colonel Heron, Director of Medical Services of Palestine, describes the ophthalmic relief work carried out under the aegis of the Palestinian Government. This is apart from the work undertaken by the numerous hospitals maintained by religious and other bodies.

There are three special ophthalmic clinics and also a travelling ophthalmic clinic; besides this eight ophthalmic centres are conducted as branches of general clinics at different large towns, at each of which there is a specially trained nurse and a male orderly.

A special service to control epidemic conjunctivitis is in operation in Hebron and Majdal sub-districts and consists of one mobile clinic and of two central clinics each with a medical officer and nurse. In connection with these there are subsidiary ophthalmic first-aid posts in villages conducted by medical orderlies under the supervision of the medical officers of the central clinics. This special service dealt with about 34,000 new cases, of which 18,000 thousand were of acute conjunctivitis.

In the schools there is an extremely high incidence of trachoma among new pupils. In some localities of the Southern district practically every new entrant is affected. Some simple treatment is carried out at all schools under Government control by teachers or school nurses.

Exigencies of finance have prevented the Director from carrying out all that he desired; it is to be feared that in view of the rioting and strikes during 1936, he will be still further hampered.

CORRESPONDENCE

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIRS,—I wish to thank Dr. Pines for his kind reference to me in his letter published in your issue of August last. However, it is my duty to point out that there is a very simple explanation for the case he cites as one of acute trachoma.

The history is that the emigrant was passed as non-trachomatous before leaving Poland; he developed an acute inflammation during the voyage to America and was refused admission.

It is obvious that the early signs of quiet trachoma were not recognized before embarkation, and that on the voyage a superimposed Koch-Weeks infection developed, which attracted the attention of the Port Medical Officers.

Even when the examination of a doubtful case of trachoma is made with every optical assistance it may be difficult to make a correct diagnosis; this I experienced last week in the case of a young child with no physical signs except a slight general reddening of the conjunctiva, and trachomatous vascularization of the upper fifth of the corneal periphery, seen only by using the reflected light of the slit-lamp, a phenomenon which I had missed on a previous occasion when seeing this child.

Yours faithfully,

A. F. MACCALLAN.

33, WELBECK STREET, W.1
November 14, 1936.

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIRS,—I read with great interest the paper by Graeme Talbot on pernicious anaemia and retrobulbar neuritis (*Brit. Jl. of Ophthal.*, November, 1936). The cord symptoms of this disease (" myelitis ") are not influenced by liver therapy, but respond well to vitamin B1. The rôle of vitamin B complex in pernicious anaemia was emphasized lately by Karczag. This treatment is indicated in the forementioned case anyhow; it would be highly interesting to note any influence on the optic nerve.

Several papers report successful administration of vitamin B1 in various forms of polyneuritis, pregnancy, toxic, etc. And though personally I had no experience with aneurin, I suggest to try it in various pathological conditions of the optic nerve, *e.g.*,

inflammations, degeneration. Any improvement in these difficult conditions would be of great value.

Recent papers on this subject are to be found in the *Schweiz. Med. Woch.*, Vol. XLI, pages 977 and 985, further in *Brit. Med. Jl.* November 7, 1936.

Yours faithfully,

STEPHEN DE GRÓSZ, M.D.

MÁRIA U. 39, BUDAPEST,
HUNGARY. *November* 13, 1936.

"POSTERIOR NEEDLING" IN THE TREATMENT OF LAMELLAR AND OTHER FORMS OF SOFT CATARACT

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIRS,—Dr. Ballantyne's not too severe treatment of my letter on the above subject renders the task of making my final reply comparatively easy.

Dr. Ballantyne does not specify the dates of the textbooks he consulted, but the operative technique in the anterior needling operation has undergone a few modifications in the last 20 years or so, thereby eliminating the uncertainties and complications which have driven him to favour the posterior needling operation.

The term " practically intact capsule " refers to those cases where the opening in the capsule has been too small, so that a certain amount of aqueous fluid has gained access to the interior of the lens and caused some swelling and opacity of the fibres; subsequently the wound in the capsule heals or becomes blocked up so that the swollen lens matter cannot get out and swelling of the lens is produced.

No doubt the experiments performed by Sir John Parsons over 30 years ago were conducted for the purpose which Dr. Ballantyne indicates, but it is the description of the accompanying changes in the vitreous in many cases which has created in me the disinclination to disturb the vitreous through a wound in the sclera, unless absolutely necessary.

Also, I think it is the experience of most ophthalmic surgeons that in penetrating wounds of the eye, one can hold out more favourable prognosis in cases where the injury has not involved the vitreous but has been confined to the anterior part of the

globe. Therefore, for the various reasons I have mentioned I prefer the anterior needling operation.

Yours faithfully,

MALCOLM L. HEPBURN.

LONDON, *December* 4, 1936.

NOTES

Death

THE death of Dr. Daniel H. Velez, of Mexico, is recorded in a recent number of the *American Journal of Ophthalmology*, where a short notice of him by his friend, Dr. Manuel Uribe-Troncoso, appears. Velez was for many years professor of ophthalmology at the medical school and university of Mexico. Dr. Velez served in the army medical service and held the rank of of Lieut.-Colonel. In 1899, he joined Dr. Uribe-Troncoso in founding the Mexican Ophthalmological Society, and in editing the "Annales de Oftalmologia."

* * * *

Appointment

DR. FRANCIS H. ADLER has been elected Professor of Ophthalmology at the University of Pennsylvania.

* * * *

Trachoma

DR. R. J. V. PULVERTAFT has recently published a paper in the *Revue du Trachome* entitled, "The Nature of the so-called Follicles in the second stage of Trachoma," in which he drew attention to the histological changes in the nature of bleb-like excrescences which he attributed to blockage of the tarsal glands. Dr. Pulvertaft wishes to point out that in the summary of the literature he omitted to acknowledge Professor Birch-Hirschfeld's paper in *La Revue Internat. du Trachome* (1930), in which the same histological changes are described, as he had not seen this distinguished author's paper.

FUTURE ARRANGEMENTS

1937

January 8.—*Royal Society of Medicine; Section of Ophthalmology.*

January 29.—North of England Ophthalmological Society, at *Sheffield.*

February 1.—North of England Ophthalmological Society, at *Manchester.*

February 2.—Midland Ophthalmological Society, at Derbyshire Royal Infirmary, Derby.

February 5.—North of England Ophthalmological Society, at Newcastle-on-Tyne.

February 12.—Royal Society of Medicine; Section of Ophthalmology.

March 5.—North of England Ophthalmological Society, at Liverpool.

March 12.—Royal Society of Medicine; Section of Ophthalmology (Clinical Meeting).

April 9.—North of England Ophthalmological Society, at Sheffield.

April 16.—Midland Ophthalmological Society, at the Nottingham Eye Infirmary.

June 4.—Midland Ophthalmological Society, at Shrewsbury Eye Hospital.

June 11.—Royal Society of Medicine; Section of Ophthalmology (Annual).

July 8-10.—Oxford Ophthalmological Congress, at Oxford.

October 1—Midland Ophthalmological Society, at the Eye Hospital, Birmingham (Annual Meeting).

December 7.—Midland Ophthalmological Society, at Birmingham Eye Hospital (Middlemore Lecture).

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *November, 1936.*

BARKAN. A new operation for chronic glaucoma.

PARK. An investigation of the angular relation of the visual (visierlinie) and optic (corneal) axes of the eye.

JAMES and SIEFKER. Observations on the reducing substances (glucose) of the aqueous and vitreous humours of the eye.

SANYAL. Keratoconjunctivitis with adenitis in Calcutta.

BRESSLER. Orthoptic treatment of strabismus.

LUCKIESH and MOSS. Visual tasks in sight-saving classes.

ALLEN. Failures and successes in the operative treatment of detachment of the retina.

Annales d'Oculistique. *October, 1936.*

MAGITOT. Pathological ocular hypotension.

CHARAMIS. Contribution to the surgical treatment of congenital colobomata of the eyelids.

Archives d'Ophtalmologie. *November, 1936.*

FRANCESCHETTI and SCHLAPPI. A case of hyperfunction of the inferior oblique of the left eye after a double paralysis of the superior obliques.

DUCUING, COUADAU and LU-VAN-XUONG. The treatment of epithelioma of the eyelids.

Revue d'Oto-Neuro-Oftalmologie. *November, 1936.*

SCHAEFFER and DE TREIGNY. The Argyll Robertson sign. Its relation to atrophy of the iris.
WEILL and KOUTSEFF. Clinical forms of osteomyelitis of the roof of the orbit.
DE MARTEL, FRANÇOIS and GUILLAUME. Aneurismal dilatation of the ophthalmic artery having produced a superior pseudo-hemianopic visual field loss.

Rassegna Italiana d'Ottalmologia. *May-June, 1936.*

PERGOLA. Ocular alterations in xeroderma pigmentosum.
BORSOTTI. The behaviour of the so-called reticulo-endothelium in septic lesions of the cornea.
MARUCCI. Four cases of traumatic myopia.
FONTANA. Weltman's serocoagulonocculation in some ocular diseases.
LICHERI. The behaviour of tryptophane in ocular diseases of a constitutional character.
FARINA. Traumatic paranchymatous keratitis in one eye with extension of the process to the other.
BERTOLDI. Onset, course, and departure of bilateral chorio-retinitis characterized by considerable sub-retinal exudation.
GALLENGA. Orbital hypertension from cephalocele, orbital complications from anterior cerebro-ventricular puncture.

July-August, 1936.

TRISTAINO. Epibulbar reticulo-endothelioma,
BARATTA. The application in ophthalmology of the rapid reaction of Chediak-Dahr for the diagnosis of syphilis.
RUBINO. The electrolytic threshold (Weltman's sero-reaction) in some ocular affections.
MORETTI. Case of orbital reticuloma with singular histological picture.
BUSSOLA. Initial epithelioma and a carcinomatous epithelioma of the limbus.
DUC. Considerations on the surgical treatment of glaucoma with particular regard to the permeability of the cicatrix after Elliot's trephine.
FARINA. Physiological and pathological astigmatism.
CARDELLO. Duplicity of the inferior lacrymal canaliculus.
TESTA. Clinical and histological contribution to the knowledge of tumours of the plica semilunaris and of the glandular formations.

Archivos de Oftalmologia de Buenos Aires. *August, 1936.*

SENÁ. Multiple pigmented congenital cysts of the iris.
DAMEL and ADROGUÉ. The optic vesicle, colobomata of the fundus and other malformations.

September, 1936.

MALBRÁN and ADROGUÉ. Doyne's choroiditis.
SATANOWSKY and KURLAT. An interesting case of syphilis of the palpebral conjunctiva.
MALBRÁN and RIEGA. A case of double hemianopia.
VON GROLMAN. Choroiditis ossificans.
BELGERI. Impressions about trachoma on my visit to Santiago.

Revista de Ophthalmologica. *September, 1936.*

VALLE. Prophylaxis for the blindness of leprosy.
ALVES. Dislocation of the lens.

Revista Oto-Neuro-Oftalmologica y de Cirugia Neurologica Sud-Americana. *November, 1936.*

PAVIA. Fundus of the eye. Infra-red retinography.
MENDOZA. The treatment of alternating strabismus with equal retinal images.